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CUNNINGHAM (H. S.). **Lima Bean seed treatment on Long Island.**—*Phytopathology*, xxxiv, 9, pp. 790–798, 2 graphs, 1944.

A tabulated survey is given of five years' seed treatment experiments on Lima beans [*Phaseolus lunatus*] at the Long Island Vegetable Research Farm, the results of which are not considered to warrant the recommendation of the practice as likely to be profitable on a commercial scale. Most of the preparations tested, however, notably spergon, improved the stands under exceptionally dry weather conditions and showed some value as seed-protectants.

WAGER (V. A.). **Bacterial wilt of the Egg-plant.**—*Fmg S. Afr.*, xix, 223, pp. 661–664, 3 figs., 1944.

In many parts of South Africa *Bacterium* [*Xanthomonas*] *solanacearum* is a limiting factor in eggplant production, and in some areas the disease has become so serious that neither potatoes nor tomatoes can be grown. In laboratory tests the tree tomato [*Cyphomandra betacea*] and certain chilli varieties also wilted after inoculation. Peanuts are susceptible, but the small Spanish type or Natal common two-kernel peanut is reported to be more resistant than the Virginia Bunch variety. Under the conditions prevailing in South Africa tobacco appears to be immune. Spread commonly occurs through the carriage of infected soil from one farm or field to another and through the use of infected seed potatoes. As the bacteria rapidly succumb to drying, they are not likely to be wind-borne.

The disease is observed only during summer, soil temperatures of over 60° F. being necessary for its development. Thus, in most areas it is almost impossible to grow eggplants, tomatoes, or potatoes in summer, but where no frosts are experienced, good crops of these vegetables can be grown in winter, even in infected soil.

The only method of control at present available is to keep the disease away from new lands. No susceptible crop should be planted in infected soil for several years. Only healthy seed potatoes should be used, and tomato or eggplant seed should be planted in virgin soil or in soil sterilized by baking in an oven or by building a fire over the seed-beds.

In laboratory tests with tomato varieties reported from various countries as resistant only Matale and Kopek showed high resistance, but the former was very susceptible when planted in an infected field.

VAUGHAN (E. K.). **Peanut seed treatment in Virginia—1944.**—*Plant Dis. Reptr*, xxviii, 21, pp. 672–675, 1944. [Mimeographed.]

In tests carried out in Virginia in 1943 with the co-operation of growers, greatly improved stands resulted from the treatment of groundnut seed with arasan (2 oz. per 100 lb.), particularly where soil and climatic conditions were unfavourable and where machine-shelled seed was used. Thus, in Greensville County, in seven tests, the percentage increases in stand (machine-shelled seed) due to the treatment were

112, 34, 41, 14, 279, 295, and 171 per cent., while in Sussex County in 17 tests (hand- and machine-shelled) they ranged from 21 to 324 per cent. Taking all the localities together, the hand-shelled and machine-shelled seed showed, respectively, 38·5 and 99·2 per cent. increase in stand due to the treatment.

In another series of tests, using machine-shelled seed, arasan (50 per cent. tetramethyl-thiuram disulphide), 2 per cent. ceresan (2 per cent. ethyl mercury chloride), and spergon (98 per cent. tetrachloro-para-benzoquinone) gave, respectively, 100·3, 94, and 66·6 per cent. increase in stand (average for 14 tests with each material).

CARSNER (E.). **The term viruliferous.**—*Phytopathology*, xxxiv, 8, pp. 766–768, 1944.

The term 'viruliferous', as applied to the insect vectors of plant diseases by Carsner and Stahl [*R.A.M.*, iv, p. 76], has come into general and appropriate use in the phytopathological literature in this correct sense, but of late several instances of its misapplication have been noted. Thus Valleau has referred to plant tissue as 'viruliferous' [ibid., xx, p. 600; xxii, p. 181], and his usage has been adopted by F. Johnson and L. K. Jones [ibid., xxiii, p. 421]. In this way the predominating notion of movement, implicit in the word 'viruliferous', is quite lost, and the original precise meaning of the term is corrupted. Another innovation deprecated by the writer is the substitution by Frampton *et al.* [ibid., xxii, p. 75] of the older medical term 'viriferous' for 'viruliferous'.

DU PLESSIS (S. J.). **Powdery mildew or Oidium-disease of the Vine.**—*Fmg S. Afr.*, xix, 223, pp. 641–648, 668, 4 figs., 2 graphs, 1944.

In South Africa the most critical period for infection of vines by powdery mildew [*Uncinula necator*: *R.A.M.*, xxiii, p. 251] is from the beginning of November until the middle of December. Experimental data on the Riesling variety clearly indicated that winter spraying with lime-sulphur (1 in 8) did not, in itself, reduce the incidence of the disease, and this result was repeatedly confirmed by tests made from 1939 to 1942 on Bottelary, Banhoek, and Groot-Drakenstein vines.

In comparative tests with Bordeaux mixture [cf. ibid., xxiii, p. 327], a manganese-sulphate-lime mixture, and sulphur, the last-named consistently gave the best results, which were so outstanding that the use of anything except sulphur against *U. necator* is definitely not recommended. Lime treatments were totally ineffective, while additions of lime to sulphur reduced the fungicidal activity of the sulphur.

It was found that diluting 'lightning' sulphur with up to 20 per cent. kaolin did not reduce fungicidal efficiency. While particularly refined sulphurs are not necessary against *U. necator*, the mixtures used should, as a rule, contain at least 90 per cent. sulphur; mixtures with up to 80 per cent. are allowable only if care is taken to spread the sulphur well over all the vines. Fewer but more thorough applications are preferable to six or seven weak treatments.

Experimental evidence showed that sulphur applications made in October and November are the most valuable. Further, the three summer treatments carried out (October to December) also gave the best results against anthracnose [*Elsinoe ampelina*] and leaf spot diseases [unspecified] in most areas, including Transvaal and the Orange River irrigation area. Sulphur is also effective against leaf spots due to *Isariopsis*[*fuckelii*: ibid., xxii, p. 89] and *Exosporium*. The regular execution of a standard dusting programme in which sulphur is applied during summer, with a supplementary winter spraying where anthracnose occurs, is strongly recommended.

When weather conditions are promising and the vines are only slightly damp with dew, dusting should be carried out before breakfast. Treatments, though thorough, must be as light as possible, to avoid sulphur scalds.

Eastham (A.) & Brett (C. C.). **The Official Seed Testing Station for England and Wales. Twenty-second Annual Report covering the period 1st August, 1938–31st July, 1939.**—*J. nat. Inst. agric. Bot.*, v, 1, pp. 105–113, 1944.

During the period under review the percentage (1·6) of wheat samples containing bunt (*Tilletia caries*) 'balls' is lower than in any previous season on record, and that of barley [covered] smut (*Ustilago hordei*) lower than in any of the five preceding years. Ergot (*Claviceps purpurea*), however, was higher in rye (28·1 per cent.) than in any year since 1928–9, the incidence of this disease having risen progressively since 1934–5; the corresponding figure for 1937–8 was 23·8. The same fungus caused only 0·2 per cent. infection in wheat.

Of 36 samples of celery seed examined for the presence of *Septoria apii* and *Phoma apiicola* [*R.A.M.*, xi, p. 91], 28 were infected by the former and 18 by the latter.

[Waterston (J. M.).] **Plant pathology.**—*Rep. Dep. Agric. Bermuda, 1943*, pp. 7–8, 1944.

The so-called 'blight' of Bermuda cedar [*Juniperus bermudiana*] referred to in the previous year's report [*R.A.M.*, xxiii, p. 6] was shown during 1943 to be an entomological problem. Among the new fungal records may be mentioned *Delacroixia coronata* (Cost.) Sacc. & Syd., an occupant of *J. bermudiana* foliage that preys on the dry wood termite (*Kalotermes approximatus*) under humid conditions; *Microsphaera euphorbiae* on *Hibiscus sabdariffa*; *Uromyces dolicholi* on *Cajanus cajan*; *Erysiphe graminis* on barley; and *Bacillus phytophthorus* [*Erwinia phytophthora*] on Sebago seed potatoes imported from Maine. New host records include *Sclerotinia sclerotiorum* on *C. cajan* pods and *Cephaleuros mycoidea* on pimento leaves.

Mention is made on p. 6 of a trial of oats resistant to crown rust (*Puccinia coronata*) supplied by T. R. Stanton of the United States Department of Agriculture. Four varieties proved to be immune from the disease under the experimental conditions, namely, Bond (2733), Sac (3907), Bond × Fulghum (4076), and Bond × Alber. Crown rust being the chief obstacle to the cultivation of oats as a green fodder crop, a large supply of Sac was procured for extensive trials in 1944.

Science for the farmer.—*Rep. Pa agric. Exp. Sta., 1943–44* (*Bull.* 464), 40 pp., 12 figs., 1944.

On p. 11 of this report [cf. *R.A.M.*, xxiii, p. 167] it is stated that several [unnamed] potato varieties immune from blight [*Phytophthora infestans*], bred by W. R. Mills, gave yields of over 200 bush. per acre, though the season was hot and dry, and yields in general were low.

On p. 18 it is stated that fermate at 1 lb. per 100 gals. plus 1 lb. dry-wettable sulphur in the pink, petal-fall, and first cover sprays gave excellent control of cedar rust [*Gymnosporangium juniperi-virginianae*] on York Imperial apples.

Stevenson (J. A.) & Wellman (F. L.). **A preliminary account of the plant diseases of El Salvador.**—*J. Wash. Acad. Sci.*, xxxiv, 8, pp. 259–268, 1944.

This annotated list of diseases of economic plants collected in Salvador during the period May to the middle of August, 1943, contains, among many others, the following records. Onions and leeks showed black mould and purplish lesions on the leaves due to *Alternaria porri*. Beet leaves showed the presence of *Cercospora beticola*. *C. capsici* and *C. diffusa* were found on leaves of *Capsicum frutescens*. *Carica papaya* showed powdery mildew (*Oidium caricae*) and the leaf spot due to *Pucciniopsis caricae*. *Colletotrichum coffeanum* [*Glomerella cingulata*] was noted on coffee leaves and *A. carotae* on carrot leaves. Fig rust (*Physopella fici*) [?*Phakopsora nishidana*: *R.A.M.*, xvii, p. 841] was present in the uredo stage only. *Mycosphaerella*

fragariae was found on strawberry (*Fragaria chiloensis*), in its conidial state, *Ramularia tulasnei*. *Cladosporium fulvum* and *Septoria lycopersici* were common on tomato, *Cercospora musae* occurred on banana, and *Claviceps paspali* on *Paspalum* sp. *A. vitis* was associated with vine leaf spots. Among maize diseases found, *Nigrospora oryzae* and *Physoderma zeae-maydis* [*P. maydis*] may be mentioned.

Brown (J. G.) & Boyle (Alice M.). **Effect of penicillin on a plant pathogen.**—*Phytopathology*, xxxiv, 8, pp. 760–761, 1 fig., 1944.

Penicillin was produced by *Penicillium notatum* on a modified Czapek-Dox and maize grain decoction in an apparatus based on that described by Clifton (*Science*, N.S., xcviii, pp. 67–70, 1943) and tested at the Arizona Agricultural Experiment Station for its bactericidal action on the destructive Gram-positive parasite, *Erwinia carnegieana*, of the giant cactus [*Carnegiea gigantea*]. The anti-bacterial substance was found to exert a similar inhibitory effect on the plant pathogen to that observed in plates of *Staphylococcus aureus* in a comparative series of tests [cf. *R.A.M.*, xxiii, p. 56]. Indications were further obtained that *Corynebacterium sepedonicum*, the agent of potato ring rot, is also susceptible to penicillin.

Baker (R. E. D.) & Dale (W. T.). **Witches' broom disease investigations. X. Loss of pods in I.C.S. clones at River Estate during 1943. XI. Observations on the effect of planting interval on witches' broom disease at River Estate.**—*Trop. Agriculture, Trin.*, xxi, 10, pp. 196–198; 198–199, 1944.

In further work on cacao witches' broom [*Marasmius perniciosus*: *R.A.M.*, xxiv, p. 9] in Trinidad, the clones of I.C. Selections under trial in field 7 were examined for the first time for pod resistance in 1943. Of 17,364 pods harvested from Set I (I.C.S. 1, 3, 4, 5, 6, and 8), II (I.C.S. 1, 7, 16, 22, 45, and 53), and III (I.C.S. 1, 2, 9, 12, 60, and 98), 1,757 or 10 per cent. were affected. In this field strenuous attempts at control had been made, but in the adjoining field, where no control had been undertaken, the loss amounted to 44 per cent. The total yield for Set I was 5,024 pods, of which 2,983 were harvested in July and August, with 2 per cent. infection present. It is apparent that the clones in Set I, except I.C.S. 3, showed a considerable degree of disease avoidance, setting most of their crop during the dry months, when severe infection was impossible. In the remainder of the year Set I gave 2,041 pods, with 30 per cent. infection. Of these six clones, I.C.S. 1, 4, and 6 appear to show more resistance than I.C.S. 3, 5, and 8. This difference, if significant, could be due to true resistance. Two of the clones, I.C.S. 1 and 6, in this more resistant group are very promising. In Sets II and III, all the clones except I.C.S. 7, which appears to be a very poor one, show considerable disease avoidance. Considering all the clones together, I.C.S. 1, 4, 6, 45, and 98 show some promise of resistance in addition to avoidance; I.C.S. 2, 7, 9, 12, 53, and 60 are doubtful; and I.C.S. 3, 5, 8, 16, and 22 are poor. I.C.S. 1, 6, and 45 are also promising for high yield, high pod value, and quality.

It is pointed out that these results must be viewed with caution as yet, since they are rather at variance with those from seedling trees [loc. cit.] where no evidence of pod resistance was found.

In the second paper experimental results are given which do not support the view that close planting reduces pod infections, but do suggest that close-planted trees stand up better to the disease and yield much more heavily than widely spaced trees.

Stevenson (J. A.) & Johnson (A. G.). **Nomenclature of the cereal smut fungi.**—*Plant Dis. Reptr*, xxviii, 20, pp. 663–670, 1944. [Mimeographed.]

The acceptance in 1940 of the International Rules of Botanical Nomenclature by the United States Department of Agriculture and the Bureau of Plant Industry

has made it necessary to change some of the names commonly used in American mycological practice. The names of cereal smuts presented here are those that appear to be applicable under the Rules, as interpreted by the authors, after all possible consideration has been given to the opinions and suggestions of mycologists interested in the group both in the United States and Canada and in Great Britain, to whom preliminary lists had been submitted for criticism. In each case the pertinent synonymy is given and comment offered in some cases to explain the reasons for the decisions made. *Sphacelotheca destruens* is accepted for millet smut, and it is pointed out that Persoon's subspecific name *panici-miliacei* cannot be legitimately used for this species, since the specific epithet *destruens* is available and must be taken up under the provisions of Article 58 of the Rules. *Tilletia caries* is accepted in place of *T. tritici*, *T. foetida* in place of *T. foetens* or *T. levis*, *Ustilago kolleri* in place of *U. levis* in accordance with Article 58, and *U. maydis* in place of *U. zeae*, the specific epithet *zeae* being rejected as pre-Persoonian and neither De Candolle's varietal name *mays-zeae* being available under Article 58 nor the binomial *Uredo zeae-mays*, as cited by Ciferri.

Leach (W.). **Studies on the metabolism of cereal grains. III. The influence of atmospheric humidity and mould infection on the carbon dioxide output of Wheat.**—*Canad. J. Res.*, Sect. C, xxii, 4, pp. 150–161, 5 graphs, 1944.

In the present study, conducted at Winnipeg, Manitoba, weighed lots of about 30 grains of Renown wheat with an initial moisture content of 10 per cent. were placed in the upper dish in the catharometer plant chamber, while a measured amount of distilled water, sufficient to raise the water content of the grain as desired, was added to the filter paper in the lower dish; the plant chamber was then sealed up, placed in the 25° C. thermostat bath, and, after a two- or three-hour settling-down period, the carbon dioxide records were made, the grain weighed, and its final moisture content calculated [the procedure is described]. The data obtained showed that, with the final moisture content below 20 per cent., the respiration rate of the wheat grains increased only very slowly over an experimental period of about 100 hours, whereas with the final moisture content rising above 20 per cent. the respiration rate showed a marked and steadily increasing acceleration. The removal of the embryos, the main seat of metabolic activity, from the wheat kernels did not, contrary to expectation, lower the carbon dioxide production, but instead resulted in a more rapid acceleration of respiration. This is interpreted as a definite proof that the rise in carbon dioxide production in damp wheat (when unlimited absorption of water and germination are prevented) is due, not to respiration of the grain itself, but to that of contaminating micro-organisms, which in the present study appear to be mainly fungi (predominantly species of *Penicillium*, *Aspergillus*, and *Fusarium*, also *Cladosporium herbarum*, types of *Alternaria tenuis*, various yeasts, and *Monilia*). Throughout all the experiments a distinct fungous growth was observed on both whole and de-germed wheat grains, where the final moisture content of the grain was not lower than 19 per cent. This growth was more abundant on grain with a higher moisture content than on that with a lower one.

To examine the effect of atmospheric moisture on the growth of moulds contaminating grain the experimental procedure was adapted as follows. Wheat with an initial moisture content of 12·45 per cent. was placed in the upper dish and 2 c.c. of a saturated solution of one of several salts selected to bring the relative humidity of the air to certain predetermined values in the lower. The data obtained showed that mould growth was practically inhibited when the relative humidity of the air surrounding the grain was about 90·7 per cent., while it persisted and continued to increase in rate of growth as well as of carbon dioxide production when the humidity was raised to 93 per cent. and above.

Ho (W. C.). **Soil-inhabiting fungi attacking the roots of Maize.**—*Res. Bull. Ia agric. Exp. Sta.* 332, pp. 403–446, 6 figs., 1944.

In a study of the pathogens attacking maize seeds and seedlings the organisms most frequently found on decayed seeds were *Pythium debaryanum*, *Gibberella saubinetii* [*G. zeae*], *Penicillium oxalicum*, *Trichoderma lignorum* [*T. viride*], and *Fusarium* spp. Those noted on diseased roots were *Pythium debaryanum*, *P. graminicola*, *G. zeae*, *Helminthosporium sativum*, *Rhizoctonia* [*Corticium*] *solani*, *T. viride*, *Fusarium moniliforme* [*G. fujikuroi*], and *Fusarium* spp. Isolations from infected mesocotyls gave mainly *G. zeae*, *C. solani*, *H. sativum*, *Penicillium oxalicum*, *T. viride*, and *Fusarium* spp., while those from diseased plumules yielded *G. zeae*, *F.* spp., and *Rhizopus* spp. *Diplodia zeae* and *G. fujikuroi* were present on the crowns.

These organisms fall into three groups based on their pathogenicity to maize in the greenhouse and field; (*a*) highly destructive: *Pythium debaryanum*, *P. graminicola*, and *G. zeae*; (*b*) moderately destructive: *C. solani*, *H. sativum*, and *Penicillium oxalicum*; (*c*) slightly destructive: *Aspergillus niger*, *G. fujikuroi*, *T. viride*, *Rhizopus* sp., and *Fusarium* spp.

Greenhouse and field data indicated that *Pythium debaryanum* caused heavy seed decay, particularly when the soil temperature was under 16° C. and the soil moisture content reached 70 per cent. or over. In one test, for example, seed of inbred Black 345 maize planted in the laboratory in naturally infected soil kept at 15° subsequently showed 60 to 100 per cent. decay, as against only about 5 per cent. for the seeds in the control pots. Of the isolates obtained from these decayed seeds 61 per cent. were *P. debaryanum*. Small, necrotic lesions were found on the roots of the seedlings from the infected soil, but those of the seedlings from the control pots showed no trace of infection: *P. debaryanum* was frequently isolated from these lesions. Inoculations with these cultures induced similar root injuries, the pathogen being re-isolated from the infected tissue. *G. zeae* and *P. graminicola* also caused considerable decay in cases where *P. debaryanum* was scarce or inactive in the soil. *P. graminicola* was isolated frequently from roots, but only occasionally from decayed seed. In one laboratory test inbred Lancaster 317 seed was planted in naturally infected soil and germination was about 49 per cent. lower at 15° than at 26°, though in the control pots, containing steamed soil, there was no marked difference as between the two temperatures. Isolations from the infected seeds yielded *P. graminicola*, *P. debaryanum*, *G. zeae*, *T. viride*, *G. fujikuroi*, and *Fusarium* spp. Necrotic lesions on the root tips of the plants taken from the infested soil were more distinct in the 26° than in the 15° series. All isolates from the infected root tips were *P. graminicola*. This fungus appeared to cause more seed decay at low than high temperatures, while root infection appeared to be favoured by high temperatures. Field tests gave similar results. Temperature specifically influences the amount of infection and the subsequent development of the disease caused by *P. graminicola*.

G. zeae was the organism most commonly isolated from the necrotic lesions on roots and mesocotyls of seedlings, and was observed frequently on the pericarp of decayed seed. It was often associated with, or followed injury by, *P. graminicola*.

Most strains of *H. sativum* were only slightly pathogenic, but one strain (isolate 9035) repeatedly caused severe stunting and blighting of maize seedlings in the greenhouse. Under field conditions these symptoms were often marked by those already produced by more aggressive pathogens. The other organisms mentioned, except one strain of *C. solani*, were secondary invaders or saprophytes.

P. debaryanum was ascertained to become parasitic before and after emergence, during the second half of May, causing seed decay, stunted growth, and tip necrosis on the primary and some of the seminal roots. As the season advanced

and the soil temperature rose, *P. graminicola* induced rapid necrosis, producing a brown, water-soaked appearance on the tips of most of the roots. At the same time, *G. zeae* and *C. solani* were often present on the lower part of the mesocotyl and later caused discoloration and necrosis of the roots. Other organisms, such as *H. sativum* and *Penicillium oxalicum*, later on produced further necrotic lesions on the mesocotyl and basal portion of the roots. Still later, *Fusarium* spp., *A. niger*, *T. viride*, and other soil saprophytes were isolated from lesions on the root and mesocotyl. This group often developed extensively, leaving no trace of the fungi that had prevailed earlier.

Rosen (H. R.) & Larsh (H. W.). **Prevalence of Rhynchosporium scald on Barley in Arkansas in 1944.**—*Plant Dis. Reptr*, xxviii, 20, pp. 641–643, 1944. [Mimeographed.]

Rhynchosporium secalis [*R.A.M.*, xvii, p. 22], causing scald of barley, is stated to have been by far the most common and destructive disease of the winter crop in Arkansas in 1944. In nursery rows it appeared in abundance early in the season and was responsible for an estimated loss of from 50 to 75 per cent. of the leaf area of seedlings in the flag-leaf stage, and almost complete destruction of the leaf area in the milk stage. Of the varieties examined for leaf-area losses, 29 were highly susceptible and suffered the above-mentioned loss, while 12, including Tennessee Winter C.I 6034, showed some degree of resistance, their losses in leaf area ranging from a trace to 25 per cent. Under Arkansas conditions the early stage of infection took the form of dark brown spots and streaks which gradually become light brown to straw-coloured in the interior, delineated by a much darker brown, narrow margin. As far as is known the disease is not seed-borne, yet it was found that no infection occurred till late in the growing season in plots sown with seed treated with new improved ceresan.

Bliss (D. E.) & Fawcett (H. S.). **The morphology and taxonomy of Alternaria citri.**—*Mycologia*, xxxvi, 5, pp. 469–502, 3 figs., 12 graphs, 1944.

Alternaria citri, described by Pierce in 1902, and accredited to Ellis and Pierce, is widely distributed throughout the temperate and subtropical zones, but appears to be unknown in tropical regions. Confusion regarding the morphological limits of the species has arisen because type specimens and illustrative material are lacking. Pierce (*Bot. Gaz.*, xxxiii, pp. 234–235, 1902) stated that single-spore cultures had been made, and that detailed descriptions and illustrations would be published, but these data do not appear ever to have seen the light, and as far as can be ascertained no fungous material studied by Ellis and Pierce is available. In the absence of such material uncertainty has arisen as to the characteristics and limits of the fungus, and as to the identity of related organisms. A photograph of Pierce's unpublished drawings (the only ones known to exist) of the black rot of oranges and of the spores of *A. citri* was lent to the authors by Mrs. Newton B. Pierce.

New evidence is presented on the morphology and taxonomy of the fungus, based on a statistical study of 26 isolates from Washington Navel orange, Deglet Noor date palm, and Holguin guava, from various parts of southern California, including some of the places where Pierce found his specimens. Marked differences appeared when transfers of the same isolate were cultured on different media, but there was much similarity between various isolates when cultured under uniform conditions on the same medium.

Measurements were made of 2,629 spores. On Czapek's agar isolates from citrus fruits produced spores 8·1 to 81 μ long, including beaks (86·9 per cent. measuring 10·4 to 37·3 μ long), and 6·3 to 24·3 μ wide (89·3 per cent. measuring 7·7 to 15·7 μ wide). The beaks measured up to 54 (90·7 per cent. up to 7·6) μ long. On maize

meal agar the spores were narrower, with longer beaks. On citrus fruit slices 93·8 per cent. of the spores were 10·4 to 26·5 μ long.

Transverse septa ranged from 0 to 11, commonly 1 to 4. On Czapek's agar, 40·6 to 51·5 per cent. of the spores had three transverse septa, but on citrus fruit slices under 25 per cent. had three septa and about 50 per cent. were 1-septate. Among 40,000 spores grown on the different media the following percentages were beaked: on citrus fruit slices, 31·1 to 37·8 per cent.; on Czapek's agar, 61·1 to 62·9 per cent.; and on maize meal agar, 84·9 to 87·5 per cent. The percentages of beaked spores were higher in cultures with long, straight spore chains than in those with short or branched chains. On maize meal agar the spore chains were longer than on Czapek's agar.

The chief differences between the authors' emended description and the original ones, and between the authors' illustrations and Pierce's are attributable to the effect of different substrates. Pierce's concept was based on the fungus as it appeared in or on orange fruits, the authors' on its appearance in culture. The fungus is best identified when freshly isolated cultures are observed under standard conditions. Examination of numerous isolates and herbarium specimens revealed large variations in spore size within individual cultures and specimens.

Species considered by the authors to be similar to *A. citri* are *Stemphylium citri* (probably identical), *Macrosporium citri*, *A. mali*, and *A. tenuis* as reported on figs by Brooks and McCulloch [*R.A.M.*, xvii, p. 538]. While retaining *A. tenuis* as the type species of the genus, the authors suggest that the short-spored, short-beaked species should be tentatively grouped about some other species, such as *A. citri*.

Tidd (J. S.). **California Citrus psorosis survey.**—*Plant Dis. Reptr*, xxviii, 20, pp. 638–640, 1944. [Mimeographed.]

The data from psorosis (type A) [*R.A.M.*, xxiii, p. 61] surveys in Californian orange groves collected during 1943 by H. A. Harris and in 1944 by the author show that the amount of diseased Navel and Valencia trees ranged from 0·45 to 29·87 per cent.; and the total estimated crop loss (both from psorosis-diseased as well as replanted trees, which produce a smaller crop than the older original trees) from 0·10 to 17·01 per cent. In general, the older groves showed a higher percentage of loss due to psorosis than the younger ones. It appeared that in older groves (Navel trees 35 to 50 years old and Valencias 25 to 27 years old) the average amount of fruit produced by a psorosis tree is about $\frac{1}{3}$ less than that produced by a normal, healthy one in the same age and variety group.

The stubborn disease of citrus [ibid., xxiii, p. 294] was encountered in none of the Valencia groves and in only three of the four Navel groves surveyed by the author. Scattered 'stubborn' trees in three different groves were estimated to produce from 30·1 to 49·5 per cent. less fruit than healthy ones.

Bliss (D. E.). **A new species of Alternaria on fruit of Phoenix dactylifera.**—*Mycologia*, xxxvi, 5, pp. 538–549, 2 figs., 1 graph, 1944.

A new species of *Alternaria*, associated with spoilage of date fruits in California, is named *A. stemphylioides* n.sp. On Czapek's agar it forms effused, dark olive to black colonies. The hyaline, septate, branched hyphae are 3 to 6 μ in diameter. The simple or branched, septate, slender conidiophores, not swollen at the apex, are 3 to 8 μ in diameter and up to 200 μ long, with thin-walled apical cells becoming dark brown, geniculate, scarred, and broader than the hyaline basal cells. The acrogenous, solitary, or 2-3-catenulate conidia are brownish-olive, darkening with age, opaque, oval, ovate, rotund, subangular, or obclavate, slightly constricted at the septa, muriform, with 0 to 9 (mostly 1 to 4) transverse and 0 to 3 longitudinal septa. They measure (including beak) 14 to 77 (mostly 16 to 28) by 10 to 17 μ, mean, 26·1 by 12·7 μ, and are non-beaked or beaked. Secondary

conidia are produced acrogenously on the beaks of primary conidia, these beaks becoming secondary conidiophores.

The percentages of beaked spores varied considerably on different media (e.g., from 1·5 per cent. on cultures in Czapek's agar with no sucrose to 28·8 per cent. when 3 per cent. sucrose was present). Size and septation were also affected by sugar content.

Although similar to certain species of *Stemphylium*, especially of the *Pseudostemphylium* group, the fungus is referred to *Alternaria* because of its beaked spores and unswollen conidiophores. From a taxonomic point of view it appears to occupy an intermediate position between the *A. citri* group of *Alternaria* and the *Pseudostemphylium* group of *Stemphylium*.

Cunningham (I. J.), Swan (J. B.), & Hopkirk (C. S. M.). **The symptoms of ergot poisoning in Sheep.**—*N.Z.J. Sci. Tech.*, A, xxvi, 3, pp. 121–124, 1944.

The outstanding symptoms in sheep experimentally fed on perennial rye grass infected by ergot (*Claviceps purpurea*) [*R.A.M.*, xxi, pp. 205, 452, and next abstracts] were inflammation and ulceration of the mucosa of the alimentary tract. Ergot poisoning, however, does not present a sufficiently characteristic picture to permit a diagnosis on the basis of symptoms and lesions alone: before a positive conclusion could be reached it would be necessary to demonstrate accessibility to the infected grass and the absence of other causes of gastroenteritis.

Cunningham (I. J.), McIntosh (I. G.), & Swan (J. B.). **The non-toxicity of milk and meat from ergotized Cattle.**—*N.Z.J. Sci. Tech.*, A, xxvi, 3, pp. 125–136, 1944.

A detailed, tabulated account is given of chemical investigations and feeding experiments on various animals, the results of which showed that, even under the most favourable conditions for ergot (*Claviceps purpurea*) ingestion from the fodder grasses *Lolium perenne* [see preceding abstract] and *Festuca arundinacea*, the toxins were not transmitted to the milk or body tissues. It is concluded, therefore, that no risk to human health is incurred by the consumption of meat or milk from cattle that may have access to ergotized pasture grasses.

Hassall (C. H.). **The alkaloidal constituents of New Zealand ergot.**—*N.Z.J. Sci. Tech.*, B, xxv, 4, pp. 169–174, 1944.

The methods of separation of the active constituents of a commercial sample of New Zealand ergot (*Claviceps purpurea*) containing material from both marram grass [*Psamma arenaria*] and tall fescue (*Festuca elatior*) [*R.A.M.*, xxi, pp. 205, 452 and preceding abstracts] are described, and its alkaloids identified as ergotaminine, ergotoxine, ergotamine, and a trace of ergosinine.

Lamy (L.). **Intensité et vitesse relatives de la formation des dispositifs capteurs chez les Hyphomycètes prédateurs de nématodes.** [Relative intensity and velocity of formation of the trapping apparatus in the Hyphomycetes preying on nematodes.]—*C.R. Soc. Biol., Paris*, cxxxvii, 11–12, pp. 337–339, 1943.

In two series of experiments at 20° to 22° C., one with hyphae from pure cultures and the other with mycelium from freshly germinating spores, the author determined the optimum concentrations of (*a*) horse serum and (*b*) *Lumbricus rubellus* extract for the formation of 'traps' by the nematode-destroying group of Hyphomycetes, notably *Dactyella bembicodes* [*R.A.M.*, xxiii, p. 436 and next abstract]. These were found to be about 1 in 10 for the former and 1 in 100 for the latter medium, the minima being 1 in 100 and 1 in 1,000, respectively, and the maximum for (*a*) between 1 in 2 and the pure serum. The capturing apparatus was formed

more rapidly, as well as in greater profusion, at the optimum concentration, e.g., after 16 hours on serum at 1 in 10 as compared with 25 at 1 in 2.

Deschiens (R.) & Lamy (L.). **Conditions pratiques de culture, de sporulation et de récolte des spores d'Hyphomycètes predateurs de nématodes.** [Practical conditions of culture, sporulation, and collection of the spores of Hyphomycetes preying on nematodes.]—*C.R. Soc. Biol., Paris*, cxxxvii, 11–12, pp. 381–383, 1943.

By means of the following simplified technique, the writers hope to extend the application of soil treatment with the spores of anti-larval fungi, e.g., *Arthrobotrys*, *Dactylella* (including *D. bembicodes* [see preceding abstract]), and *Dactylaria* spp., more especially against Strongyloid nematodes, to pastures, meadows, and other large areas. The organisms are grown at 25° C. from spores or from hyphae on agar squares in tubes on a medium consisting of 150 gm. maize seeds and 5 gm. malt extract (or 20 gm. maltose) per l. water sterilized for 15 minutes at 115°; the bouillon may also be prepared with beans, peas, or chick peas. Sporulation commences on the 15th day and reaches a maximum on the 30th, when the spores may be collected, dried in a desiccator at 37° to 40° or by exposure to the air for a week, and incorporated with pulverized anhydrous soil (10 gm. for each mycelial disk of 22 mm. in diameter, containing an average of 17,420 spores). Under such conditions the spores remain viable for over a year.

Wilson (I. M.). **Wilt disease of Flax in Great Britain.**—*Nature, Lond.*, cliv, 3918, p. 709, 1944.

During the last three seasons a serious disease has occurred in experimental plots at Aberystwyth in which oil varieties of flax (*Linum usitatissimum*) are grown, *Fusarium lini*, being repeatedly isolated from the stems, roots, and seeds. This is a new record for Great Britain. *F. culmorum* was found in association with *F. lini* on the seed.

Gould (C. J.). **Tulip blight controlled by organic sulphurs.**—*Phytopathology*, xxxiv, 7, pp. 703–704, 1944.

Of the several fungicides tested in 1942 and 1943 at the Washington Agricultural Experiment Station for the control of tulip blight (*Botrytis tulipae*) on the Rev. H. Ewbank, William Pitt, and Rose Copeland varieties, fermate and thiosan, the latter also tested in Holland in 1938 under the name of 'tulisan' with promising results [*R.A.M.*, xix, p. 195], were the most effective. Of these two closely related preparations, both of which are derivatives of dithiocarbamic acid, fermate gives slightly superior control of the pathogen and was accordingly recommended for trials on a commercial scale, applications to be made at a dosage of 2 lb. in 100 gals. water at ten-day intervals, beginning when the leaves attain a height of 3 to 4 in. It is apt, however, to induce a splotchy appearance of the plants when applied by means of a knapsack sprayer, and the less conspicuous thiosan is therefore preferable for use in home gardens.

Dosdall (Louise). **Rhizome treatments for controlling Botrytis crown rot in Iris.**—*Phytopathology*, xxxiv, 9, pp. 772–789, 5 diags., 1944.

Iris crown rot (*Sclerotinia convoluta*) [*R.A.M.*, xvi, p. 750] has been under observation in Minnesota since 1934, and in this paper a comprehensive, tabulated account is presented of experiments on the control of the disease, involving the application of a number of fungicides to 5,330 rhizomes of 14 varieties.

The external symptoms of the rot are so inconspicuous as to be generally overlooked by growers, who attribute to winter injury the loss of plants actually caused by the potentially destructive fungus, which may be borne on apparently

sound rhizomes from infested plantings, as well as on those harbouring conidia and sclerotia or developing the characteristic decay in the spring. In one year's test (1934–5) the incidence of crown rot was much less severe among plants covered with a straw mulch than in those left uncovered (2 as compared with 9 per cent.). Treatment of the rhizomes at transplanting time with mercury compounds, e.g., calomel [mercurous chloride] 1 in 128, semesan 1 in 400 or 1 in 200, yellow mercury oxide 1 in 128, mercuric chloride 1 in 1,000, or the same plus 1 per cent. hydrochloric acid, effectively combated the disease in clean, but not in heavily infested soil; under the latter conditions, however, some promise was shown by a mercurous chloride suspension stabilized with gum arabic. Some of the formalin treatments were equally effective with acid mercury in clean soil, but further trials are required to determine a satisfactory relation between the concentration of the solution and the immersion period. Another point needing elucidation is the variable response of different varieties to the same treatment.

Brierley (P.) & Smith (F. F.). **Studies on Lily virus diseases : the mottle group.**—*Phytopathology*, xxxiv, 8, pp. 718–746, 11 figs., 1944.

Continuing their studies on lily viruses [*R.A.M.*, xxiv, p. 18], the writers describe their comparative studies on three types of mottling, namely, a latent form from *Lilium tigrinum* (LT), the strong or coarse mottle of *L. longiflorum* (CM), and a more virulent derivative of the latter (VCM), in relation to McWhorter's tulip viruses, TV I and TV II [ibid., xvii, p. 603], in the test species *L. longiflorum*, *L. formosanum*, *L. tigrinum*, and Clara Butt tulip.

The host range of CM was found to be limited to Liliaceae, including *Calochortus* sp., *Fritillaria pudica*, tulip, and *Zygadenus fremontii*, besides the above-mentioned *L.* spp., *L. dauricum*, *L. davidi* var. *willmottiae*, *L. elegans*, *L. formosanum*, *L. leucanthum*, *L. superbum*, and *L. umbellatum*, and that of the other four viruses was similar, except that VCM also attacks *Ornithogalum thyrsoides*.

The properties of the five viruses were determined in *L. formosanum*. The thermal inactivation points of VCM, CM, and TV I were found to lie between 60° and 65°, and those of TV II and LT between 55° and 60° C. VCM and TV I retained their activity after dilution to 10^{-4}, CM at $10^{-3.5}$, TV II at 10^{-3}, and LT at 10^{-1}. All five survived four days' ageing at 18°, while CM was still virulent after five, and VCM and TV I after six days. VCM withstood six hours' drying on cloth, CM and TV I four hours, and TV II and LT less than two.

CM is transmitted by *Aphis gossypii*, *Macrosiphum solanifolii*, and *Myzus persicae*, the last-named likewise acting as an efficient vector of the other four viruses under observation. Besides *M. persicae* and *Macrosiphum solanifolii*, *Aphis fabae* and *A. gossypii* were shown for the first time to serve as vectors of the tulip-breaking virus (a mixture of TV I and TV II) from Rembrandt tulips to *L. formosanum*. CM, naturally or experimentally established in *L. longiflorum*, conferred absolute protection against the further addition of the same virus or VCM, an effect which was not exerted by TV I and TV II or LT from *L. tigrinum* in respect of VCM, while LT also failed to prevent the reinfection of *L. longiflorum* from CM in a destructive form.

Over 12,000 *L. longiflorum* seedlings raised from seed from diseased parents yielded no evidence of perpetuation of any of the lily viruses through this channel.

On the basis of these studies the authors propose to regard the five viruses under discussion as strains or subspecies of the tulip-breaking virus (*Marmor tulipae* Holmes amended) [ibid., xix, p. 229], which will correspond to *Tulipa* virus I (Cayley) Smith, omitting the supposed hosts *Hyacinthus* and *Narcissus*. VCM is considered to be a mutant from CM appearing in *L. longiflorum* stocks harbouring the latter virus. Easter lily-growers already ignore the presence of CM in *L. longiflorum*, the roguing of which for production of virus-free stocks has been

found impracticable, and a similar course is recommended in respect of VCM. although infection by the latter results in a certain (so far not unduly high) proportion of culls.

Whetzel (H. H.). **The scab disease of Violets.** -*Plant Dis. Reptr*, xxviii, 23, pp. 769–770, 1944. [Mimeographed.]

During the summer of 1942 *Viola jooi* plants in the author's garden at Ithaca, New York, developed infection by *Sphaceloma violae* [*R.A.M.*, xxii, p. 250]. During the preceding ten years the plants had shown no trace of the disease and how the fungus gained admission to the garden remains unexplained. The disease spread rapidly to hundreds of *V. jooi* plants during the summer of 1943, many being killed and almost all the others badly deformed. Very little seed set and matured, the pedicels and seed capsules, as well as the young leaf petioles, being severely infected. In 1944 several species of wild violets and some pansies were also attacked, heavy infection being present on *V. striata*, *V. palmata*, *V. vilmoriniana*, *V. canadensis*, *V. sororia*, *V. odorata* (blue-flowered), *V. tricolor* (wild form), *V. tricolor* var. *hortensis*, and a large-flowered white violet, possibly *V. papilionacea* var. *alba*.

The disease presents a grave threat to garden-grown species of violets. It has not yet, apparently, attacked northern violets growing in the wild, but in the District of Columbia it has been reported on wild violets in gardens.

Linder (D. H.). **A new rust of Orchids.**—*Mycologia*, xxxvi, 5, pp. 464–468, 8 figs., 1944.

A Latin diagnosis (with English description) is given of *Sphenospora kevorkianii* n.sp., causing considerable damage on *Epidendrum difforme* in Nicaragua, 1943.

Tompkins (C. M.). **Basal rot of Mums in California plantings.**—Reprinted from *Flor. Rev.*, 11th May, 1 p., 1944.

A basal rot of soft green cuttings of the pompom and large-flowering varieties of *Chrysanthemum hortorum*, occurring annually in a destructive form in cloth-house cutting benches in San Mateo County, California, from January to April, was shown by the weekly investigation of diseased material in February and March, 1944, to be associated with three fungi, viz., *Fusarium* sp., *Pythium* sp., and *Sclerotinia sclerotiorum*. Experiments to determine the relation of these organisms, if any, to the etiology of the rot are in progress. During the period covered by the observations, the weather was exceptionally dry and the incidence of infection consequently subnormal, but the outcome of tests of various fungicides for the control of the disease was highly promising in respect of fermate, with or without an admixture of celite 505 (a diatomaceous earth) in equal proportions.

Allison (J. L.) & Torrie (J. H.). **Effect of several seed protectants on germination and stands of various forage legumes.**—*Phytopathology*, xxxiv, 9, pp. 799–804, 1944.

This is a report on the results of greenhouse and field trials at the Wisconsin Agricultural Experiment Station in 1942–3 to determine the influence of seed treatment with 5 per cent. new improved ceresan, spergon, and 50 per cent. arasan on the germination and stands of lucerne, white-flowered sweet clover (*Melilotus alba*), and medium red, alsike, strawberry, and Ladino clovers (*Trifolium pratense*, *T. hybridum*, *T. fragiferum*, and *T. repens*, respectively) [*R.A.M.*, xx, p. 211; xxii, p. 485]. Although large quantities of each fungicide adhered to the seeds (roughly 1 per cent. by weight), no reduction of germination occurred, though spergon retarded the process in *T. fragiferum* and *T. repens*. In the greenhouse tests the protectants gave a measure of control against pre-emergence damping-off

in compost soil infested with *Pythium*, *Rhizoctonia*, and *Fusarium* spp., significant increases in total emergence being registered for all treatments in the case of lucerne and *T. hybridum*, for new improved ceresan with *M. alba*, and for the same preparation and arasan with red clover. Spergon not only delayed emergence of *T. fragiferum* and *T. repens* but total emergence was very significantly reduced, indicating that the protectant so inhibited germination that the damping-off organisms were able to cause pre-emergent damping-off and rotting of the seedlings. In fungus-free woods-humus, only *M. alba* and *T. repens* responded favourably to any of the treatments, which presumably acted as stimulants to germination under such conditions. Field stands were not significantly improved by any of the fungicides, the general use of which cannot be advocated for Wisconsin on the basis of these investigations.

Jones (F. R.). **Life history of Cercospora on Sweetclover.**—*Mycologia*, xxxvi, 5, pp. 518–525, 1944.

Evidence is presented linking together a *Mycosphaerella* found in 1937 on overwintered stems of sweet clover (*Melilotus alba* and *M. officinalis*), the *Cercospora* commonly causing leaf spot and stem-blackening of sweet clover, referred to *C. davisii*, and a spermogonial stage on the same host.

Spots caused by *C. davisii* chiefly occur on older leaves of sweet clover. On stems the fungus produces discolorations. On stems of the first year's growth reddish-brown lesions develop, while on second-year growth the fungus usually becomes conspicuous when the plants are about to blossom. Pedicels become infected, maturing seed may fall prematurely, and the seed may be penetrated. The fungus varies greatly in intensity from year to year and is often in association with *M. lethalis*, which causes a somewhat similar discoloration of stems. Following the work of Horsfall [*R.A.M.*, ix, p. 319] *C. zebrina* has been generally adopted for the *Cercospora* on species of *Trifolium*, *Medicago*, and *Melilotus*, but Nagel (in an unpublished thesis of Iowa State College) made inoculations with the *Cercospora* from *Melilotus* on 16 species in *Medicago* and *Trifolium* and on *Melilotus alba* and only infected the last-named. This evidence and that in the present paper provide good reason for retaining the name *C. davisii* for this fungus.

In autumn small pycnidia with minute spores, apparently spermatia, often develop on blackened stems that have borne the conidial stage. None of these were observed on leaves. At first, they overflow with spermatia, but in late autumn they may be empty. The spermatia have not been germinated. This stage was cultured only by transferring the structure to an agar substratum; when this was done in late autumn, the structures sent out mycelium of *Cercospora* alone in most of the transplants. On pieces of infected stems incubated at temperatures of 8° to 16° C. spermogonia were produced, their development apparently being conditioned by temperature. That these spermogonia developed on inoculated plants apparently free from other fungi under the same conditions that favoured their development in the field strongly suggests that they belong to the life-cycle of the fungus. The spermogonia did not, however, develop in pure culture even on *Melilotus* stems.

In inoculation tests infection was always most successful in the older leaves and on the stems of second-year growth of sweet clover after blossoming had started. No visibly successful infection of first-year stems was made in the greenhouse. Isolations in the field showed that such stems are infected, though perhaps rarely or never with the fruiting stage. Inoculations were made with cultures of *Cercospora* from sweet clover, lucerne, and red clover upon all three, but infection resulted only upon the host from which the culture was obtained. At present it is convenient to regard the *Cercospora* on lucerne and that on red clover as distinct species.

Extreme and uniform resistance to stem-blackening by *C. davisii* was observed during two summers in selfed lines of *M. alba* derived from three resistant plants selected by Dr. W. K. Smith in a planting from seed collected by Westover and Wellman in Turkey in 1936, and designated by the Foreign Plant Introduction number 120,048.

The fungus, which is named *Mycosphaerella davisii* n.sp., is described as having dark, spherical perithecia 70 to 100 μ in diameter, cylindrical to club-shaped eight-spored asci without paraphyses, measuring 40 to 60 by 10 μ, and irregularly biseriate ascospores measuring 12 to 20 by 4 to 5 μ. The spermogonia develop in late summer and autumn on mature and dying stems only, especially at the margins of lesions; they are black, subepidermal, erumpent, often flattened and approaching an acervulus in form, with ostiole variable in size, and measure 80 to 120 μ in diameter. The rod-shaped spermatia measure about 1·5 to 3 by 1 μ. Solheim's amended description of *C. davisii* [ibid., x, 59] is reproduced.

Harris (M. R.) & Schlocker (A.). **A survey of the Alfalfa dwarf disease in California.**—*Bull. Dep. Agric. Calif.*, xxxii, 2, pp. 163–167, 1 map, 1943.

Following the detection of lucerne dwarf in the southern San Joaquin Valley of California [*R.A.M.*, xxi, p. 278], a survey was made in 1942 to determine the extent and severity of the disease in the State, which for this purpose was divided into four areas, San Francisco Bay, North and South Central Valleys, and Southern California. The two former regions were altogether free from dwarf, which was present, on the other hand, in six counties each of the two latter. The most remarkable feature of the survey was the uniform spread of the disease northwards as far as Merced County (South Central Valley), where all traces of infection abruptly ceased, while the absence of dwarf from the parts of the Mojave Desert under lucerne is also of interest. In this connexion the two outstanding problems awaiting solution are (*a*) the identity of the insect vectors and their natural ranges, and (*b*) the discovery of alternate hosts.

In localities where dwarf was rife, it was estimated that the duration of life of the average lucerne stand was curtailed from upwards of ten to four years, or three in cases of extreme severity. In dwarf-free areas the stands may reach the age of 20 or even 40 years in a vigorous and productive condition.

Of the other lucerne diseases encountered in the course of the inspections, bacterial wilt (*Phytomonas insidiosa*) [*Corynebacterium insidiosum*] was the most destructive; mildew (*Peronospora trifoliorum*) was a prevalent early-season trouble that disappeared with the onset of hot, dry weather; leaf spot (*Pseudopeziza medicaginis*) was widespread but unimportant; and crown wart (*Urophlyctis alfalfae*) was observed only once or twice, causing negligible damage.

Hirschhorn (Elisa). **Nota sinonímica : Tolyposporium senegalense es sinónimo de T. bullatum.** [Note on synonymy: *Tolyposporium senegalense* is a synonym of *T. bullatum*.]—*Rev. argent. Agron.*, viii, 4, pp. 384–386, 1 pl., 1 fig., 1941. [Received December, 1944.]

The characteristic features of a specimen of *Tolyposporium senegalense* [*R.A.M.*, xx, p. 180] collected by Spegazzini at Dakar on *Pennisetum typhoideum* [*P. typhoides*] in 1913 and described in *An. Mus. La Plata*, xxvi, p. 118, 1915, include oval, black, compact sori, 4 to 6 by 3 to 4 mm., composed of globose, elliptical, or irregular, blackish or chestnut-coloured glomerules, 70 to 180 by 70 to 100 μ, and gilt or olive-yellow, oval or polygonal, rarely globose chlamydospores, 6 to 8 or 9 by 6 to 7 μ, enveloped in a smooth or slightly papillate membrane with projecting folds simulating slender mycelial processes. These characters are in almost complete agreement with those of *T. bullatum* Schroeter (Crypt. Fl. Schles., p. 276, cited by Saccardo, Syll. Fung., vii, p. 502, 1888), found on *Echinochloa crus-galli*

in Germany, and the Senegalese material is accordingly referred to the latter species on grounds of priority. In both cases the inflorescences were attacked and the ovaries destroyed, some of the flowers on each head remaining healthy.

Fagan (F. N.), Frear (D. E. H.), & Miller (H. J.). **Speed sprayer is big labor saver ; works best on medium high trees.**—*Rep. Pa agric. Exp. Sta., 1942–43* (*Bull.* 446), *Suppl.* 3, pp. 2–3, 3 figs., 1944.

Tests on fruit trees in Pennsylvania in 1943 using a speed sprayer [*R.A.M.*, xxiii, p. 444] and an ordinary high-pressure outfit indicated that the former definitely reduces the time required for spraying. A heavy crop only very moderately affected by disease was obtained from the trees sprayed with the new machine, labour costs were halved, and the sprays were applied more speedily than has ever been possible with a high-pressure machine. Coverage, however, as estimated by residue tests, was not as good in the tops as it was in the bottoms of the trees. As far as is known at present the speed sprayer does very praiseworthy work on fairly open trees which are not too high. The trees sprayed in the test were apples, 24 and 30 ft. high. Those with relatively open tops lent themselves best to the new method.

The speed sprayer used consisted of a 500 gal. agitator tank from which the spray mixture is forced by means of a rotary pump developing 40 to 50 lb. pressure. The spray emerges from 86 nozzles at the rear, a propellor-like fan blowing the spray up and through the trees. A 76 h.p. motor drives the propellor at 2,400 r.p.m. A 500 gal. tank load was applied in 20 minutes, at the rate of about 1 tree per minute. Under these conditions, two men working on trees requiring 12 to 20 or more gals. per tree could do 2 to $2\frac{1}{2}$ times as much work as two men with the high-pressure rig. An average of 2·3 more gals. of spray per tree was required than with the high-pressure outfit.

At harvest 300 fruits from the top and bottom, respectively, of the McIntosh trees were examined for scab [*Venturia inaequalis*]. The top fruit speed-sprayed and high pressure-sprayed had 16·1 and 7·8 per cent. infection, respectively, and the bottom fruit 1·5 and 0·9 per cent., respectively.

Powell (H. R.) & Cass Smith (W. P.). **The eradication of black spot or Apple scab in Western Australia.**—*J. Dep. Agric. W. Aust.*, Ser. 2, xxi, 11, pp. 148–155, 5 figs., 1944.

Apple scab [*Venturia inaequalis*] is stated to be present in every apple-growing country in the world except that no outbreak has occurred in Western Australia, since the season 1939–40 [*R.A.M.*, xix, p. 546], when the attacks were more serious than ever before.

The chief eradication measures adopted were as follows. A. When the outbreak was discovered, all visibly infected fruits and leaves were removed and destroyed, and all trees in the infected area as well as the ground under them were immediately sprayed with home-made Bordeaux mixture (6–6–40) plus spreader, a buffer area round the diseased trees also being sprayed with the same at 3–5–50 strength, plus spreader. B. After picking, the trees and ground were again sprayed with Bordeaux mixture (6–6–50) plus spreader, and no apples were sent away without official permission, and then only to approved destinations. Early in April a quick-growing cover crop was sown at a shallow depth to prevent infected leaves from blowing about, and in August or early September, but at least a fortnight before spur burst, the cover crop was deeply ploughed under in one direction, subsequent cultivation being delayed until approved, and limited to very light harrowing. In spring all the trees were sprayed as follows: (*a*) at spur-time, when the tips of the young leaves were showing, with Bordeaux mixture (5–4–50) plus spreader, (*b*) at the pinking stage of blossoming when most of the blossoms were

showing pink, but before the petals had opened out, with Bordeaux mixture (3–4–50) plus spreader, and (*c*) at petal-fall, with Bordeaux mixture (2–5–50) plus spreader. The measures listed under B were enforced each year until every infected orchard had remained visibly free from the disease for two full growing seasons. Of 23 orchards originally infected 20 have remained visibly free from infection for four full seasons, and the remainder for three.

Hockey (J. E.) & Eidt (C. C.). **Resistance of Apple seedlings to scab.**—*Sci. Agric.*, xxiv, 11, pp. 542–550, 1944.

In this paper the authors present the results of observations made during at least four years on the resistance to foliage scab (*Venturia inaequalis*) shown in Nova Scotia by some 30,000 apple seedlings of known varietal parentage allowed to develop for five or six years without fungicidal protection. Observations were made each year in July and August, the system used in recording the disease being as follows. Numbers were applied, 1 indicating no scab, 2 scab spots distinctly separate, 3 and 4 (not used), 5 scab very diffuse, 6 scab spots killed out, brown spots or flecks. Following each number or combination of numbers was a letter, A signifying less than 10 per cent. of the foliage affected, B 10 to 50 per cent. affected, C over 50 per cent. affected. A numerical system also recorded the disease on the fruit, the figures ranging from 0 (no scab) to 5, large active spots, coalescing, fruit cracking. By giving each rating a numerical value it was possible to obtain an average rating for the period of the work and to reduce the seedlings into the four groups, susceptible, slightly susceptible, slightly resistant, and resistant.

The evidence obtained indicated that resistance was recessive to susceptibility. The apparent resistance of triploid varieties would seem to be due to delayed foliation, leading to avoidance of infection. In the early stages of growth low apparent vigour in susceptible seedlings was due to severe infection. The variety Red Winter Reinette was the most resistant parent used, while the Cox Orange and Golden Russet gave good proportions of resistant progeny. With the exception of Delicious × Yellow Transparent, all crosses with Yellow Transparent as a male parent gave over 37 per cent. seedlings with resistance. The nearest approach to immunity observed locally was in seedlings of *Pyrus niedzwetzkyana*.

Fitzpatrick (R. E.), Mellor (F. C.), & Welsh (M. F.). **Crown rot of Apple trees in British Columbia—rootstock and scion resistance trials.**—*Sci. Agric.*, xxiv, 11, pp. 533–541, 1944.

Details are given of tests carried out to ascertain the resistance shown by 40 different apple varieties and seedlings to *Phytophthora cactorum* [*R.A.M.*, xxii, p. 30] in British Columbia, and to determine whether depth of planting affected incidence. Inoculations on 1,560 trees showed that 11 varieties were quite susceptible and 11 partially so, while Antonovka, Columbia, Dolgo, Haas, Malling II, Robin, and Transcendent were resistant. There was no significant difference in the amount of rot that developed when the trees were planted with the union 4 in. above, at, or 4 in. below the ground-line.

Singh (U. B.). **The pink disease of Apple in Kumaun.**—*Indian J. agric. Sci.*, xiii, 5, pp. 528–530, 1943.

Corticium salmonicolor has been observed in Chaubattia, India, indiscriminately attacking the apple, pear, and apricot. Inoculation experiments established the pathogenicity of the fungus, which produces its maximum effect from August to mid-September, the principal sources of infection being the spores of the *Necator* [*decretus*: *R.A.M.*, vi, p. 125] stage, and less frequently, the dry incrustations of the sterile nodular phase carried by wind and rain water. Control may be effected by painting the forks of the branches before the onset of the monsoon with a red

lead and copper carbonate paste in raw linseed oil (4:4:5); painting the pruned surfaces with the same compounds in lanoline (4:4:5); the excision of diseased material at least 2 ft. below the last site of invasion and burning or burying it after immersion in 50 per cent. copper sulphate; and the destruction (in apple orchards) of the alternate fruit hosts.

Thomas (H. Earl), Scott (C. E.), Wilson (E. E.), & Freitag (J. H.). **Dissemination of a Peach mosaic.**—*Phytopathology*, xxxiv, 7, pp. 658-661, 1 fig., 1 diag., 1944.

The disease originally known as 'Winters peach mosaic' [*R.A.M.*, xix, p. 417] and herein designated 'yellow bud mosaic' (*Unops consilii*) has been detected in 11 more orchards in the Winters district of Solano and Yolo Counties, California. The change to a more descriptive name is based on an early-season symptom sequence in which many buds on the severely affected branches, after initial growth to the length of a few mm., remain pale yellow and in a state of suspended development for a period of several weeks; at the end of this time they may either die or slowly put forth a tuft of small distorted leaves. The diseased trees occurred in compact groups, indicating that the virus agent tends to be transmitted from one tree to the next rather than over larger distances, which would result in the much more prevalent scattered type of distribution. Evidence is adduced to show that the vector of Winters peach mosaic (the identity of which has not yet been discovered), besides being very restricted as to movement, is strongly attracted to peach and apricot, finds almond less congenial, and is averse from the border rows of peach blocks.

Smith (C. O.). **A method of inoculating Peach seedlings with crown gall without using punctures.** *Phytopathology*, xxxiv, 8, pp. 764-765, 1944.

To verify the opinion of Smith and Cochran [*R.A.M.*, xxiii, p. 378] that the irrigation water used in California nurseries with no previous history of crown gall [*Bacterium tumefaciens*], where the disease is nevertheless prevalent, serves as a source of contamination, peach pits were planted in a dark-coloured mountain potting soil (P_H 8·36) previously sterilized with chloropicrin gas. A week later, as emergence was proceeding, the soil in some of the 5-gal. containers was watered with a suspension obtained by the immersion overnight of 20 fair-sized crown galls in 20 qts. water at the rate of 1 qt. per can. Following one season's growth, 175 of the 329 trees (53 per cent.) treated in this way bore galls, compared with nine of the 93 controls (9·6 per cent.). The occurrence of galls on the latter may have resulted from (*a*) spattering by the infected soil of inoculated cans, (*b*) incomplete sterilization of the planting soil, or (*c*) the pits stratified in sand or peat. The trees comprising the controls were irrigated with water from the deep wells of the Riverside city system. *Bact. tumefaciens* can enter its host only through injuries [ibid., xix, p. 549], such as those commonly inflicted by insects. These were apparently absent from the sterilized soil, but may have been introduced with the rinsing water from the unsterilized galls.

Blodgett (E. C.). **Peach calico.**—*Phytopathology*, xxxiv, 7, pp. 650-657, 1 fig., 1944.

Foliar variegation on five peach trees in Idaho was shown by bud-inoculation experiments to fall into at least two types. One of these is non-transmissible and is regarded as a chimera. It is characterized by the irregular yellowing of sharply delimited areas of three distinct shades of green. The transmissible type, known as 'calico' and attributed to a virus, takes the form of extensive chlorosis, culminating in a papery-white discoloration of the leaf and twig tissues. Affected fruits are shorter and rounder than the normal and show creamy-white to red patches.

Li (L. Y.) & Procter (C. H.). **A virus disease of Fig in New Zealand.**—*N.Z.J. Sci. Tech.*, A, xxvi, 2, pp. 88–90, 5 figs., 1944.

A virus disease of fig, the symptoms of which, both on foliage and fruit, agree closely with those of *Ficus* virus 1 Smith, 1937 [*R.A.M.*, xvii, p. 52] and of Condit and Horne's Californian fig mosaic [ibid., xxiii, p. 33], was first observed in New Zealand in 1942 at Wellington, and is now known to be present in home gardens throughout North Island. It is transmissible by grafting and budding.

Comar (C. L.) & Barr (C. G.). **Evaluation of foliage injury and water loss in connexion with use of wax and oil emulsions.** *Plant Physiol.*, xix, 1, pp. 90–104, 3 figs., 1 diag., 1944.

After pointing out that the evaluation of the effects of spray materials on plants may be confused by the lack of reliable methods for the measurements of injury caused by the treatment, the writers fully describe a method for the evaluation of the damage inflicted on plant foliage by wax and oil emulsions employed for the prevention of desiccation. The symptoms of such injury may take the form either of discoloration of the margin and tips, sometimes extending over the whole leaf blade, or of physical changes, such as withering or loss of turgidity. The experimental procedure involved the use of an environment chamber, in which light and temperature were controlled. Infra-red photography proved to be a useful adjunct in the measurement and illustration of those types of foliar damage entailing chlorophyll destruction. Sunflower was used as the test plant, and the uppermost four well-developed leaves served as an index of the entire plant for the photographs and injury ratings. Each leaf was assigned a rating of 25 for complete injury and the total for the four leaves represented the percentage rating for the whole plant. In the tests described the toxic effects of the commercial wax emulsion applied were shown to be due only to one of its components, ammonium lineolate, at concentrations of 1·5 per cent. and upwards.

Leach (L. D.) & Houston (B. R.). **Seed treatment for field and vegetable crops.**—6 pp., 2 figs., University of California Agricultural Experiment Station, 1944. [Mimeoprinted.]

Brief, practical notes are given on the seed treatment of cereal and other field crops and vegetables against diseases commonly found in California.

Hawker (L[ilian] E.). **Fungi and vitamins.**—*Roy. Coll. Sci. J.*, xiv, pp. 65–78, 1944.

In this lecture (delivered on 9th March, 1944) the author discusses with numerous references to the relevant literature the relations between fungi and vitamins in respect mainly of the effect of vitamins on fungal growth. The points dealt with comprise bios, vitamin B_1, biotin, inositol, miscellaneous growth substances, and the effect of growth substances on the reproduction of fungi. A bibliography of 79 titles is appended.

Baten (W. D.). **The discriminant function applied to spore measurements.**—*Pap. Mich. Acad. Sci.*, xxix (*1943*), Part I, pp. 3–7, 1 graph, 1944.

Three methods are presented for testing significance between means pertaining to length and width measurements of spores from two species of fungi, *Galera crispa* and *G. lactea*, the data relating to which were furnished by E. A. Bessey (*Pap. Mich. Acad. Sci.*, xxix (*1943*), Part I, pp. 9–16, 1 graph, 1944). The fungi grow side by side on the campus of Michigan State College, and the comparisons involved the measurement of 140 spores from four specimens of the former and 160 from the same number of the latter species. An analysis of variance on the measurements

of each species revealed no evidence of heterogeneity. The application of 99 percentage ellipses, however, showed that the two species differ in averages pertaining to spore measurements, while the use of R. A. Fisher's discriminant function (*Ann. Eugen.*, vii, pp. 179–188, 1936) revealed that width measurements are more important than length measurements for determining significance between them. References to the literature on the mathematics of the two last-named methods are cited.

Parris (G. K.). **A simple nuclear stain and staining technique for Helminthosporia.** —*Phytopathology*, xxxiv, 7, pp. 700–702, 1944.

The writer has obtained very satisfactory results in the staining of *Helminthosporium* spp. by the use of Maneval's acid fuchsin reagent, consisting of 30 c.c. 5 per cent. aqueous phenol, 8 to 10 c.c. 20 per cent. aqueous glacial acetic acid, 4 c.c. 30 per cent. aqueous ferric chloride, and 1 to 2 c.c. 1 per cent. aqueous solution of acid fuchsin (*Stain Tech.*, xvi, pp. 13–19, 1941).

Roberts (M.), Laufer (S.), Stewart (E. D.), & Saletan (L.). **Saccharification of Wheat by fungal amylases for alcohol production.**—*Industr. Engng Chem.*, xxxvi,-9, pp. 811–812, 1944.

Bran mashes prepared from maize, winter and spring wheat, and the granular flour of the two latter, and saccharified through the agency of the mould *Aspergillus oryzae*, yielded from 2 to 14 per cent. more alcohol than those treated with malt. Favourable conditions were provided by the use of 3 to 4 per cent. dry mould bran on a mash cooked at atmospheric pressure and saccharified at 30° C., at which temperature the yield was equal to or slightly higher than those obtained at 52·5°. The simplified procedure and high yields resulting from the substitution of 3 to 4 per cent. dry mould bran for 8 per cent. malt should be of interest to those engaged in alcohol production from wheat or granular wheat flour. The superiority of the mould method was particularly striking in the tests with flour, in which the increases amounted to 5 and 10 per cent., respectively, for winter and spring wheats over the maximum secured with 8 per cent. malt.

Vanghelovici (M.) & Serban (Felicia). **The influence of organic media on the composition of Aspergillus niger.**—*Bull. Sect. sci. Acad. roum.*, xxv, pp. 157–164, 1942. [Abs. in *Chem. Abstr.*, xxxviii, 19, p. 5252, 1944.]

When *Aspergillus niger* is grown on a mineral substratum in which glycerol replaces glucose as the sole source of carbon, marked changes occur in the composition of the mould in respect of total lipoids, nitrogen, pigments, and ash. Such modifications, however, are purely temporary, since on re-transference to a glucose medium the glycerol cultures reassume their original properties as regards colour, friability, and composition. This variation is interpreted as the first step in the direction of a true mutation [cf. *R.A.M.*, xxi, p. 468], such as is effected by certain toxic substances, e.g., colchicin, camphor, and acenaphthene, or by X-rays, and is likewise associated with well-marked alterations in the composition of the fungus. Thus the presence of harmless substances in the soil may play an important part in the development of a new species.

Jahiel (R.), Guberman (Ethel), & Kazdan (R.). **Action of radioactive substances on the speed of growth of Penicillium notatum and the production of a potent penicillin.**—*Science*, N.S., c, 2596, p. 298, 1944.

Irradiating cultures of *Penicillium notatum* by means of radium in porcelain tubes, the authors found that in the presence of the radon thus produced the peak

of secretion of potent penicillin was reached two or three days earlier than in the non-irradiated control cultures, this result being attributed mainly to the Alpha radiation. When fluorescein was added to the medium, the effect of the radioactive elements was noticeably improved.

Brian (P. W.). **Production of gliotoxin by Trichoderma viride.**—*Nature, Lond.*, cliv, 3917, pp. 667–668, 1944.

In 1942 the author received from H. Raistrick a culture supplied to the latter as Weindling's strain of *Gliocladium fimbriatum* [*R.A.M.*, xvii, p. 338], which produced gliotoxin. Later an isolate of *Trichoderma viride* (No. 211) was found to produce gliotoxin at nearly twice the rate. Another culture of *G. fimbriatum* (NCTC. No. 6599) was quite different from these two isolates (which were very similar in their microscopic cultural characters), and failed to yield gliotoxin. The original description of *G. fimbriatum* by Gilman and Abbott gave the conidial measurements as 6·5 to 9·5 by 2·5 to 4 μ, and the phialides as measuring 10 to 20 μ, and did not record the presence of chlamydospores. The corresponding measurements for *G. fimbriatum* NCTC. 6599 are 5·5 to 7·5 by 3 to 3·5 μ, and 14 to 20 μ, with no chlamydospores; for Weindling's 'strain' they are 4·4 to 5·2 by 3·5 to 4·5 μ, and 7 to 11 μ, with abundant chlamydospores; and for *T. viride* No. 211 they are 4·5 to 5·5 by 3·5 to 4·5 μ, 7 to 10 μ, with abundant chlamydospores.

From this and other evidence the author concludes that the fungus obtained as Weindling's strain of *G. fimbriatum* was actually a strain of *T. viride*. The well-known antagonistic powers of *T. viride* are probably due, in part at least, to the production of gliotoxin.

Stevenson (F. J.). **Potato breeding, whither bound?**—*Amer. Potato J.*, xxi, 7, pp. 192–199, 1944.

The author outlines the past work and future plans of the national potato-breeding programme of the United States Department of Agriculture, which has been in operation for 14 years. In the last 11 years 17 new varieties have been tested and distributed to growers. Of these the most extensively grown late variety is Katahdin (released in 1932) which comprises 16·1 per cent. of all seed certified in 1943 in the United States and 34 per cent. of that certified in the same year in the Maritime Provinces of Canada. Katahdin surpasses its nearest competitor, Green Mountain, by nearly 50 per cent. The amount of certified seed of Chippewa (1933) grown in 1943 represents 4·18 per cent. of the total for all varieties, a decrease since the previous year. Sebago (1938), with 5·66 per cent. in 1943, shows the most spectacular increase. None of the varieties released combines all the desirable characters, summarized here under 21 headings and including field immunity from mild mosaic; immunity from latent mosaic [potato virus X] and potato wart [*Synchytrium endobioticum*]; resistance to veinbanding mosaic [potato virus Y], leaf roll, yellow dwarf, tuber rot initiated by the late blight fungus [*Phytophthora infestans*], common scab [*Actinomyces scabies*], and southern bacterial wilt or brown rot [*Xanthomonas solanacearum*]; a high degree of resistance to net necrosis in the tubers caused by current-season infection by the leaf roll virus; resistance to or immunity from late blight in the foliage; and resistance to or tolerance of *Fusarium*. It is not expected that the ideal variety combining all the desirable characters will be produced in the near future, but varieties have been produced that combine earliness and good cooking quality with a high degree of resistance to blight, and others that combine earliness and high market quality with scab resistance. The scab-resistant varieties are not wholly satisfactory in other respects, but, until better ones are produced, it may become necessary to use them for a restricted but important area of the States where scab renders the production of grade 1 potatoes almost impossible. No alarm need be felt at the great number of

new varieties released; this was inevitable at first, but it will become increasingly difficult to breed any superior to those already in production.

Marritt (J. W.). **Treating, packaging, and storing Potato eye sets.**—*Sci. Agric.*, xxiv, 11, pp. 526–532, 1944.

After stating that eye sets are becoming an increasingly important factor in the seed potato trade of the Prairie Provinces of Canada, since they can be widely distributed for a small cost, the author describes experiments carried out to devise a satisfactory method of handling them to avoid deterioration. The recommendations made are as follows. (1) Carefully select the certified seed stock from which the eyes are to be taken, using only stock that has remained free during storage from frost injury and rots. The best time to make the selection is before grading. (2) Treat the tubers with an organic mercury dip before the eye sets are cut. (3) Use a tool that cuts an eye set at least $\frac{7}{8}$ in. deep and weighing $\frac{1}{2}$ oz. (4) Wash the eyes in clean water as soon as they are cut. (5) Pack the eye sets as soon as washed in a moisture-proof container, e.g., a waxed carton wrapped in waxed Kraft paper. (6) Store at 77° F. from four days to a week and then at 38° until shipped. The next-best storage is at 38° continuously.

Orlando (A.) & Silberschmidt (K.). **Estudos sôbre a transmissão do virus Y das Batatinhas por afideos.** [Studies on the transmission of Potato virus Y by aphids.]—*Biológico*, x, 8, p. 269, 1944.

Although aphids are known in other countries to be the principal vectors of potato viruses, exact information as to their part in the transmission of this group of diseases in São Paulo, Brazil, was hitherto lacking. Two of the species abundantly colonizing potatoes were identified by C. Reiniger as *Myzus persicae* and *Macrosiphum solanifolii*, while a third, of less frequent occurrence, was tentatively referred to *Myzus circumflexus*. Of the three kinds of aphids *M. persicae* proved to be the most efficient vector of virus Y, which it conveyed in some of the tests to all the plants exposed to its visits, while (?) *M. circumflexus* and *Macrosiphum solanifolii* were about equally effective, each transmitting the disease to some 50 per cent. of the test material. Two crucifers (white mustard and radish) and a member of the Solanaceae (*Datura stramonium*) were frequently found serving as natural alternate hosts of the aphids, the extermination of which by direct and indirect means should henceforth be one of the foremost objects of the phytosanitary programme for potatoes.

Godfrey (G. H.). **Control of Potato late blight in Lower Rio Grande Valley with an organic fungicide plus zinc sulfate and lime.**—*Plant Dis. Reptr*, xxviii, 20, pp. 657–659, 1944. [Mimeographed.]

In a field test conducted in the Lower Rio Grande Valley, Texas, in 1944, the organic fungicide dithane (disodium ethylene bisdithiocarbamate, previously known as He-175), with and without added zinc salts and lime, was compared with certain standard copper fungicides in the control of potato late blight (*Phytophthora infestans*) [*R.A.M.*, xxiii, p. 497]. It was shown that all treatments were superior in yield to the untreated controls. The dithane spray, with added zinc sulphate and lime, at the rates of 2–1–$\frac{1}{2}$ or 1$\frac{1}{2}$–1–$\frac{1}{2}$ lb. per 100 gals. water, gave the best yields with 242 and 239 bushels per acre, respectively, superior to yellow cuprocide or dithane zinc oxide sprays or dusts and to tribasic copper sulphate dust. The two copper dusts were significantly more effective than any of the dithane dusts, but the latter did give distinct benefit. It is concluded from these results that in the event of a serious shortage of copper a satisfactory control of late blight can be achieved with an organic fungicide in spray form.

Sanford (G. B.) & Grimble (J. G.). **Observations on phloem necrosis of Potato tubers.**—*Canad. J. Res.*, Sect. C, xxii, 4, pp. 162–170, 1 pl., 1944.

Field tests carried out in Alberta during the period from 1935 to 1943 showed that in four out of the seven random lots of certified potatoes examined (varieties Netted Gem or Russet Burbank, Vick's Extra Early, and Carter's Early Favourite) the tuber phloem necrosis, which had developed before harvest, was due to infection by the leaf-roll virus [*R.A.M.*, xxiii, p. 272], as definite leaf-roll symptoms developed the following season. It appeared that, once definite leaf-roll symptoms develop, the phloem no longer exhibits leaf-roll net necrosis [loc. cit.]. In the other three lots (Columbia Russet and Netted Gem), however, a similar and often indistinguishable tuber phloem necrosis was evidently not due to the leaf-roll virus. This latter type of necrosis was transitory, but differed from the former in that affected seed pieces produced quite normal plants free from leaf-roll symptoms. In one of the three lots the necrosis had resulted from the tomato psyllid, *Paratrioza cockerelli*, feeding on the plants during midsummer, but the agent in the other two cases is as yet unknown. The tissue surrounding the necrotic phloem elements in the tubers affected by leaf-roll was found to be uniformly fluorescent, whereas the unaffected parts of the same tubers, as well as non-necrotic tubers from leaf-roll plants, reacted negatively to ultra-violet light.

Tervet (I. W.). **Purple-top wilt of Potato and the Aster-yellows virus in the Dakotas.**—*Plant Dis. Reptr*, xxviii, 25, pp. 816–817, 1944. [Mimeographed.]

During the few weeks preceding 15th August, 1944, all plantings of carrots in gardens and truck farms in the Black Hills region of South Dakota were found to be infected, apparently, with aster yellows virus. In about half the plants evidence of infection, based on the purple colour of older leaves and the tendency for excessive development of new, chlorotic leaves, was readily seen. Carrots in farm gardens in south-western North Dakota were similarly affected.

At Mandan, North Dakota, examinations of gardens by the author and R. Sprague showed that at least 50 per cent. of the carrot plants were infected; on lettuces, some flowering shoots were distorted and chlorotic, and were assumed to be affected. Salsify was also attacked, all the plants in one planting being infected. Affected weeds included *Erigeron canadense*, *Lactuca scariola*, and species of ragweed [*Ambrosia*].

Potatoes in the Black Hills and at Mandan, growing near infected weeds or carrots were in all cases free from the symptoms of purple top wilt [*R.A.M.*, xxiii, p. 273]. In the Dakotas the evidence for associating aster yellows and purple top wilt in potatoes does not appear to be good, because in areas where aster yellows is prevalent on carrots and other plants it is often difficult to find purple top wilt on potatoes. The Bliss Triumph potato, widely grown in the Black Hills and at Mandan, is quite susceptible to purple top wilt in the Red River Valley.

Barrus (M. F.). **A Thecaphora smut on Potatoes.**—*Phytopathology*, xxxiv, 8, pp. 712–714, 2 figs., 1944.

A diagnosis [in English only] is given of *Thecaphora solani* n.sp., the agent of the 'buba' (small pustule or tumour) disease of Andean potato (*Solanum andigenum*) tubers already described from Venezuela [*R.A.M.*, xxiii, p. 118] and since ascertained to occur also in Peru and Ecuador. The pathogen is characterized by subcircular sori, up to 1 mm. long, embedded in the cortex and pith of warty, lobed, or otherwise misshapen tubers, surrounded while young by phellem and containing yellowish to rusty-brown, subspherical to ovoid spore balls, 12 to 48 by 12 to 35 μ, composed of two to eight adherent subspherical to ovoid spores (usually three to six, occasionally one), 7·5 to 20 by 8 to 17·5 μ, their contiguous walls smooth and the free wall rounded, thick, and verrucose.

Addicott (F. T.). **Anatomical effects of oil spray injury in Guayule seedlings.**—*Phytopathology*, xxxiv, 7, pp. 697–699, 2 figs., 1944.

Oil sprays used in guayule [*Parthenium argentatum*] nurseries at Salinas, California, for the extermination of weeds have been found to produce a more or less extensive brownish discoloration of the foliage, often accompanied by withering of the cotyledons. An anatomical study of fixed and stained material revealed collapse of the palisade cells within 30 minutes of exposure to the herbicide, the injurious effects of which, involving quasi-total cytolysis, reached a climax in 24 hours. The most severe damage occurred in the epidermal tissues and those of the palisade just within the stomata, i.e., in the regions in direct contact with the oil.

Robinson (R. R.). **Inhibitory plant growth factors in partially sterilized soils.**—*J. Amer. Soc. Agron.*, xxxvi, 9, pp. 726–739, 3 figs., 1944.

A full account is given of the writer's studies at the Regional Pasture Research Laboratory, State College, Pennsylvania, on the deleterious effects of steam sterilization of the soil on plant growth [*R.A.M.*, xxiii, p. 357] and the possibilities of preventing or overcoming them. Symptoms of the trouble may be expressed as retardation of growth, purple pigmentation, and mottled or necrotic foliage. In some cases seed germination is inhibited but plant growth is normal, while in others the position is reversed. The soils used in the investigations (silt loams and their subsoils and a fine sandy loam) were all low in available phosphorus, but differed widely in other respects. Of the crops tested, Ladino and red clover were particularly sensitive to the injury, tomato, barley, and maize intermediate, and rye grass [*Lolium perenne* and *L. multiflorum*] and buckwheat unaffected.

The adverse effects of sterilization were entirely counteracted by heavy applications of phosphate either before or after the treatment. They appear to be due to a toxic concentration of some as yet unidentified substance. Incubation of the soil for a few days at 50° C. acted on plant growth similarly to two hours' steam sterilization at 5 lb. pressure, the critical temperature for a wet soil lying between 40° and 45° and for a dry one somewhat higher. In steam-sterilized soil plant growth was about the same whether it was wet or dry during sterilization. The inoculation of heat-treated with untreated soil exerted little immediate effect on plant growth, but materially curtailed the duration of the inhibitory action.

Chowdhury (S.). **An Alternaria disease of Safflower.** *J. Indian bot. Soc.*, xxiii, 2, pp. 59–65, 1 pl., 1 fig., 1944.

Alternaria carthami n.sp. produces on safflower (*Carthamus tinctorius*) leaves spots composed of alternating light and dark brown, concentric rings, 1 cm. in diameter, frequently coalescing into large, irregular lesions and assuming a brittle texture which is apt to lead to the breaking of the leaf blade. The stems and petioles suffer less severe damage, but infected flower buds shrivel without opening following the extension of the dark brown spots from the base of the calyx to other parts of the inflorescence. The writer observed the disease at Pusa and other places and a report has also been received of its occurrence in the Central Provinces, but it does not appear to be known in other parts of India.

The pathogen is characterized by dark, pluriseptate hyphae; erect, simple, 0- to 5-septate, brown to olivaceous (hyaline-tipped) conidiophores, 15 to 85 by 6 to 10 μ, geniculate at the apex and sometimes laterally, and occasionally showing a spherical swelling at the base; and light brown conidia of variable shape, occurring in chains of at least two and consisting of 3 to 11 cells, with up to six longitudinal septa, measuring 36 to 99 by 12 to 28 μ (without the light brown to hyaline beak, which is usually present and ranges from 15 to 84 by 3 to 5 μ). On oatmeal agar

and other standard media the largely submerged mycelium imparted a dark green colour to the substratum. The optimum temperature for growth was found to lie between 25° and 30° C. A wide range of hydrogen-ion concentration was tolerated, with an optimum between P_H 6 and 7.

Positive results were obtained in inoculation experiments with spore suspensions or by the application to the plants of portions of cultures, the presence of moisture being essential for any appreciable degree of infection.

Cross-inoculation experiments with *A. carthami* on potato, tomato, cucumber, and cotton gave negative results, and the dimensions of the safflower fungus did not altogether correspond with those of *A. solani*, *A. tomato*, *A. cucumerina*, or *A. macrospora*, its nearest affinities. These facts appear to justify the erection of a new species for the agent of the safflower leaf spot.

Procter (C. H.). **A virus disease of Henbane (Hyoscyamus niger L.) in New Zealand.**—*N.Z.J. Sci. Tech.*, A, xxvi, 2, pp. 83–87, 7 figs., 1944.

Early in 1943, 10 to 20 per cent. of the henbane (*Hyoscyamus niger*) plants first grown experimentally in the Hutt Valley, New Zealand, in 1942 were observed to be affected by a virus disease causing in the field severe stunting and foliar mottling and puckering, and inducing in the greenhouse symptoms of three general types, viz., vein-clearing, veinbanding, and foliar mottling. The disease was communicated by leaf-rubbing with expressed juice from *H. niger* and artificially infected Warne tobacco plants to *Nicotiana rustica*, *N. glutinosa*, King Edward potato, tomato, *Petunia hybrida*, and *Solanum nigrum*. On tobacco the henbane virus causes primary vein-clearing, secondary veinbanding, and chlorotic mottling. The reactions of *N. rustica* are initially less pronounced, but typical vein-flecking and chlorotic mottling develop in the later growth. *N. glutinosa* shows mild vein-clearing, followed by yellow mottling and leaf crinkle, and later by flecked veinbanding on the lower foliage and a dark green mosaic on the auxiliary shoot leaves, while dark green streaks are also formed on the stems of old infected plants. Dark green rings, 2 to 4 mm. in diameter, with paler centres appear on inoculated potato leaves, while the petioles and stems bear brown, necrotic streaks, 1 to 3 and 4 to 6 mm. in length, respectively. Leaf-drop begins within four days of infection, progressing from the base upwards and leaving only a tuft of young leaves at the apex. Tomato leaflets develop a bronze mottling 25 days after inoculation. *P. hybrida* reacts by vein-clearing and slight to severe puckering of the foliage. On *S. nigrum* the symptoms are masked, but tobacco plants inoculated with juice from the plants contract the typical symptoms of infection.

The virus retains its pathogenicity for a period between 48 and 72 hours. Its dilution end point lies between 1 in 10,000 and 1 in 100,000, and its thermal death point between 60° and 65° C.

Notwithstanding certain resemblances, the henbane virus differs from *Hyoscyamus* virus II [potato virus Y] and *H.* virus III [henbane mosaic virus: *R.A.M.*, xii, p. 243], and from *Solanum* virus 2 [potato virus Y]. Pending further studies on its relationships, however, the virus is not to be classified as a new one.

Hirschhorn (Elisa). **Una especie de 'Ustilago' nueva para la Argentina, 'Ustilago scitaminea'.** [A species of *Ustilago* new to Argentina, *Ustilago scitaminea*.]—*Rev. argent. Agron.*, viii, 4, pp. 326–330, 2 figs., 1941. [Received December, 1944.]

In this paper the author critically compares the Tucumán material of sugar-cane smut with *Ustilago consimilis*, *U. scitaminea*, *U. sacchari*, *U. microthelis*, *U. erianthi*, and *U. pulverulenta*, and concludes that the Argentine fungus approximates most nearly to *U. scitaminea*.

Fawcett (G. L.). **El 'carbón' de la Caña de Azucar (Ustilago scitaminea Syd.).** [Sugar-Cane smut (*Ustilago scitaminea* Syd.).] —*Bol. Estac. exp. agríc. Tucumán* 47, 15 pp., 11 figs., 1944.

The available information regarding sugar-cane smut (*Ustilago scitaminea*) is summarized, with special reference to its occurrence in Tucumán, Argentina [*R.A.M.*, xxiii, p. 408]. Until recently Argentina was the only American country from which the disease had been notified with certainty, its alleged appearance in Brazil [ibid., xii, p. 723] not having been confirmed by the competent authorities, but the pathogen is now known to have spread to Paraguay. The immense numbers of chlamydospores produced within the flagelliform appendage [ibid., iv, p. 127], (15 cm. to over 1 m. in length, attached to the last internode of each infected bud), and their minute size (5 to 6 μ in diameter), account for the dissemination of these spores by the wind. In some cases the axis of the inflorescence has been found enclosed in the appendage with chlamydospores. Like other *U.* spp., the sugar-cane smut is essentially a parasite of the young meristematic tissues, entering its host exclusively through the lower part of the bud (below the scales). The mycelium has never been detected by the writer in the internodes or elsewhere, and he could not substantiate the observation of certain workers as to its passage from one bud to another by way of the internodes. His view is that each diseased bud represents a separate and independent infection emanating from one of three possible sources, namely, the soil, where the buds of the internodes below ground-level contract the disease and give rise to the smutted shoots appearing in the spring; the lateral buds producing the side branches of the cane during the summer; and the tips of the fully grown shoots. Of these, only the first is of practical importance in reducing the numbers of buds capable of forming canes fit for harvesting. When the number of smutted buds annually exceeds that of healthy ones, the stock produces fewer shoots and dies within a few years, as was the case with P.O.J. 36. Under favourable conditions the diseased buds begin to swell and grow until their development is checked by cold, dry winter weather, to be resumed in the spring, when infected shoots are produced. Non-infected buds germinate much later, so that the smut evidently accelerates shoot growth.

The chlamydospores on germination give rise to promycelia of variable dimensions, averaging 16 by 3 to 4 μ and composed of three cells, from each of which oval sporidia are produced, sometimes five or six at a time, measuring 6 by 2 μ and tapering towards the extremities. In some cases the sporidia germinate by means of long, septate hyphae, or put forth fresh sporidia from one of their extremities. Instances were also observed in which the promycelia produced, instead of sporidia, long, septate branches either from the uppermost of the three cells or the basal one. It is of interest to note that sporidia from eleven-month-old cultures grew vigorously on subculturing, indicating the probable ability of *U. scitaminea* to persist for lengthy periods on plant refuse in the soil.

A peculiar feature of transverse sections of the flagelliform appendage consisted of black 'tubes', which appeared to be composed of half-grown spores; in the case of older preparations, the latter were missing and the 'tube' walls appeared as opaque, solid membranes. Tangential sections revealed quadrangular membranes or plates, 2 to 5 by 1 to 2 mm., forming a sort of network over the surface of the sporiferous cylinder and actually representing the sides of microsori bounded below by the mycelium and above by clusters of mature spores awaiting dispersal by wind or rain. The 'tubes' are simply the spaces between the microsori viewed transversely.

Only a few of the buds inoculated with fresh spores gave rise to smutted shoots, and the slowness of the process was remarkable in a fungus of such strongly parasitic habit. This important aspect of the problem merits further study.

Generally speaking, the spores vary little either in size or colour. The mean diameter of 100 from an infected P.O.J. 36 shoot was 5·8 and the range from 5·6 to 6·9 μ. Considerable fluctuations were observed, however, among those adhering to the appendage after the fall of the majority. For instance, 100 exterior spores from a Tuc. 519 shoot measured 4·7 to 7·5 μ and those near the axis 4·1 to 9·4 (means 6·2 and 6·4 μ, respectively), while in the case of Tuc. 1376 the exterior and interior ranges were 5·6 to 7·5 and 5·4 to 8·4 μ, respectively, and the mean diameters 5·9 and 6·5 μ, respectively. These dimensions are somewhat smaller than those reported by Mundkur [ibid., xix, p. 237], but they are considered to be in sufficiently close agreement with his var. *sacchari-barberi* (also in their mummy-brown coloration) for the Argentine form to be identified with the latter. This opinion, however, is not fully shared by Dr. Elisa Hirschhorn (*Notas Mus. La Plata*. viii, pp. 23–38), who divides the Argentine material into six groups, of which one (No. 4) approximates to Mundkur's var. *sacchari-officinarum*.

On a modified Czapek's solution the Argentine collections of *U. scitaminea* grew equally well whether nitrogen was supplied in the form of inorganic salts or in that of peptone, but dextrose constituted a better source of carbon than levulose. The smut inverts saccharose but is unable to utilize cellulose, another point of interest in relation to its parasitic tendencies. Instead of cytase, the cellulose-decomposing enzyme, the fungus presumably forms some other substances capable of dissolving the cell walls through which its hyphae penetrate. Starch also proved to be unassimilable by the pathogen. The optimum hydrogen-ion concentration for the growth of *U. scitaminea* lies round about P_H 6·5, with lower and upper limits above P_H 2 and below P_H 9, respectively; the mean promycelial length at P_H 3, 4, 7·6, and 8·2 was 4, 10, 20, and 5 to 10 μ, respectively. The addition to the nutrient solutions of sodium chloride up to 5 per cent. failed to inhibit the growth of the smut, which was retarded, however, by 1 per cent. sodium carbonate.

Kern (F. D.) & Thurston (H. W.). **Additions to the Uredinales of Venezuela. IV.** —*Mycologia*, xxxvi, 5, pp. 503–517, 1944.

With this instalment 30 species are added to the published lists of Venezuelan Uredinales [*R.A.M.*, xxiii, p. 316], bringing the total up to 292.

Rogers (D. P.). **On the dates of publication of Schweinitz's Synopses.**—*Mycologia*, xxxvi, 5, pp. 526–531, 1944.

The author presents evidence showing that the date of publication of Schweinitz's 'Synopsis fungorum Carolinae Superioris secundum observationes Ludovici Davidis de Schweinitz' was 6th April, 1822, and that his 'Synopsis Fungorum in America Boreali media degentium' appeared about the middle of 1832.

Karling (J. S.). **The simple holocarpic biflagellate Phycomycetes.** —x—123 pp., 25 pl., 3 diags., New York City, published by the author, 1942. $3.50.

The simple, holocarpic, biflagellate Phycomycetes, comprising a heterogeneous collection of some 80 species characterized by reduced holocarpic thalli and biflagellate zoospores, were formerly included by most mycologists in the family Woroninaceae of the Chytridiales, while the elongate, mycelioid members were incorporated among the Lagenidiaceae. However, since the Chytridiales are furnished with posteriorly uniflagellate zoospores, the representatives of the Woroninaceae can no longer be placed in that order as now recognized, and they are therefore accorded separate treatment. Owing to the absence of well-defined taxonomic characters, no distinctive name applicable to the group in its entirety is proposed, but as an aid to classification five families are differentiated on the basis of thallus structure and mode of sexual reproduction, i.e., Woroninaceae, Ectrogellaceae, Sirolpidiaceae, Olpidiopsidaceae, and Lagenidiaceae.

Six new combinations are made, including *Olpidiopsis pythii* (Butler) comb. nov.

(*Pseudolpidium butleri*) and *O. gracile* (Butler) comb. nov. (*P. gracile*) [*R.A.M.*, xxiii, p. 114].

The holocarpic, biflagellate Phycomycetes are widely distributed in nature and ubiquitous in host range, and with a view to expeditious reference to the fungi and their substrata a complete host index and bibliography is appended to the monograph.

Orejuela (C. G.). **New or heretofore unreported species of the higher Ascomycetes from Colombia and Venezuela.**—*Mycologia*, xxxvi, 5, pp. 429-459, 1944.

This annotated list of new or hitherto unrecorded species of the higher Ascomycetes is based largely on recent collections by several persons, chiefly by Chardon and the author in Colombia and Whetzel, Barrus, and A. S. Müller in Venezuela. It comprises 50 species (16 new), 38 from Colombia and 14 from Venezuela, two of them being found in both countries.

Marchionatto (J. B.). **Una nueva especie de hongo: 'Rhinotrichum griseo-roseum, n.sp.'.** [A new species of fungus: *Rhinotrichum griseo-roseum* n.sp.]—*Rev. argent. Agron.*, viii, 4, pp. 277–280, 1 col. pl., 2 figs., 1941. [Received December, 1944.]

The examination of specimens of chilli leaves collected at Orán, Salta, Argentina, in 1940 revealed a profuse, greyish efflorescence covering the lesions induced by *Cercospora capsici* Heald & Wolf and ultimately spreading over the entire lamina. It was found to consist of the effuse, hyaline mycelium of a fungus, which was isolated in pure culture on 1 per cent. potato dextrose agar, identified as an undescribed species of *Rhinotrichum*, and designated *R. griseo-roseum* n.sp. The greyish, erect, continuous or septate conidiophores are provided with unilateral primary branches and opposite secondary ones, the surface of all being denticulate; they arise among the tufts of conidiophores of *C. capsici* and bear innumerable globose, smooth, hyaline conidia, $3\frac{1}{2}$ to 4 μ in diameter. The colours at first assume a greenish colour, which changes to Van Dyke brown and at an advanced stage to greyish-pink, the obverse being yellow or orange. Mutual aversion was manifested by *R. griseo-roseum* and *C. beticola* in mixed cultures.

Couch (J. N.). **The yeast Nadsonia in America.**—*J. Elisha Mitchell sci. Soc.*, lx, 1, pp. 11–16, 1 pl., 1944.

An account is given of *Nadsonia fulvescens*, found growing abundantly on the sap from stumps of recently cut birch trees in North Carolina.

Coker (W. C.). **The smaller species of Pleurotus in North Carolina.** *J. Elisha Mitchell sci. Soc.*, lxi, pp. 71–95, 13 pl., 1944.

This is a critically annotated list, preceded by a key, of 22 species of *Pleurotus* occurring in North Carolina, of which three are new and are described without Latin diagnoses.

Subba Rao (M. K.). **Report of the Mycologist, 1942–43. Report of the Mycologist, 1943–44.**—*Adm. Rep. Tea sci. Sect. unit. Plant. Ass. S. Ind., 1942–43*, pp. 16-21, 1943; *1943–44*, pp. 8–9, 1944.

In the first of these reports [cf. *R.A.M.*, xxi, p. 47] it is stated that continuous wet weather between June and October in southern India may have encouraged an outbreak of tea leaf disease (*Cercosporella theae*) on many estates. As a result, some estates reported a leafless condition of large areas of tea even after the rains had ceased. From the High Ranges one estate reported a chronic shuck condition leading to a gradual deterioration in yield, associated with *C. theae*. Attacks of the fungus during successive years appeared likely to be a factor of some importance

in areas where deterioration was present, and it was ascertained that *C. theae* can perpetuate itself from season to season on fallen tea leaves. In November sterile perithecia were found in abundance on the under surface of the fallen leaves, which, presumably, had fallen following an earlier attack. Detached, sterile perithecia in culture developed characteristic spores of *C. theae*. No trace of the disease could be detected on the bushes at the time. It was ascertained that in a suitably moist atmosphere the fungus could be brought into activity on fallen litter even in the absence of the sterile perithecia, though the debilitated shoots did not develop any growth of the fungus.

Tea leaves from a pruned field in the Nilgiri district were attacked by a fungus agreeing in essential respects with the description of *Phyllosticta theae* [ibid., v, p. 136; ix, p. 89].

A systematic disease of tea was observed, marked by crinkling and backward curling of the leaves, but showing no necrotic areas in the tissues or roots. No pathogenic agency appeared to be involved.

Wilting of *Chrysanthemum cinerariaefolium* associated with a species of *Fusarium* was recorded from the Nilgiris. *Oidium heveae* was also noted on *Hevea* rubber.

In the second report it is stated that no further control of *Corticium invisum* [ibid., xxi, p. 48] on tea was undertaken. The disease was recorded from a nursery in Travancore. Preliminary work on the control of *Cercosporella theae* [see above] was completed. Mouldy rot of *Hevea* rubber (*Ceratostomella fimbriata*) does not appear to be present in southern India. A leaf disease of cardamoms associated with a species of *Phyllosticta* was recorded from Mysore. A sclerotial disease of rice (? *Sclerotium oryzae*) was also reported.

Costa (A. S.) & Forster (R.). **Nota sôbre a molestia de virus de Fumo denominada faixa dos nervuras.** [Note on the Tobacco virus disease named veinbanding.]. —*Bragantia, S. Paulo*, ii, 2, pp. 56–82, 9 figs., 1942. [English summary. Abs. in *Exp. Sta. Rec.*, xc, 4, p. 492, 1944.]

Seven species of *Nicotiana*, one of *Lycopersicon*, and *Cyphomandra betacea* are added to the list of suspected hosts of the tobacco veinbanding virus in São Paulo, Brazil [*R.A.M.*, xx, p. 606]. President and Green Mountain potatoes inoculated with the virus developed local streak-like symptoms, followed by chlorotic mottling of the young foliage and, at an advanced stage, by leaf-drop streak. The virus is considered to belong to the potato virus Y group.

Kalmus (H.) & Kassanis (B.). **Reduction by carbon dioxide of susceptibility of Beans to Tobacco necrosis viruses.** —*Nature, Lond.*, cliv, 3916, pp. 641–642, 1944.

Exposure of Canadian Wonder bean plants to atmospheres containing 30 to 60 per cent. carbon dioxide greatly reduced susceptibility to tobacco necrosis viruses. As this reduction can be brought about by exposure after inoculation, the effect is due, presumably, to physiological changes within the cell, and not to the number of entry points opened during the inoculation.

In one test plants exposed immediately after inoculation for 15, 30, 60, and 120 minutes gave, respectively, 46, 39, 17, and 13 per cent. of the number of local lesions produced on the controls. When the plants were exposed for two hours they showed equally reduced susceptibility, whether inoculated immediately before or after exposure.

The changes causing reduction in susceptibility were readily reversed when the plants were returned to air; four hours after exposure, the treated plants were as susceptible as the unexposed controls. Plants inoculated four hours before exposure produced as many lesions as the controls.

As the viruses are unaffected by long exposure to saturated solutions of carbon

dioxide, the effect of the exposure is probably not a direct inactivation of the viruses. Exposure being ineffectual four hours after inoculation, it appears that in this period the virus is normally established in tissues where it multiplies, and some changes in cell metabolism prevent this establishment in the treated plants.

Woods (M. W.). **Intracellular inclusions in Tobacco mosaic-infected Nicotiana glutinosa and its hybrids.**—*Phytopathology*, xxxiv, 7, pp. 694–696, 1944.

Details are given of inoculation experiments with the tobacco mosaic virus on half leaves of *Nicotiana glutinosa* and an F_2 hybrid (*N. tabacum* var. Turkish × *N. glutinosa*) heterozygous for the necrotizing gene [*R.A.M.*, xvi, p. 417]. The inoculated rinsed leaves were cut transversely into four sectors; one sector from each leaf was kept in an unsealed container in absolute darkness at 27° to 28° C. and the others in water-saturated atmospheres in sealed glass vessels in darkness and at the same temperature under three sets of conditions, viz. (1) in plain air, (2) in a mixture of 73 per cent. oxygen, 17 per cent. nitrogen, and 10 per cent. carbon dioxide, and (3) in 90 per cent. oxygen and 10 per cent. nitrogen. After six days the leaf sectors in (1) and especially in (3) had yellowed noticeably, whereas those in (2) were still green, the necrotizing action of the virus being materially reduced. Leaf sectors in open containers developed solid-necrotic lesions that rapidly dried out. Both crystalline inclusions and X-bodies were present in the epidermal and mesophyll cells in lesions from leaves held in all the sealed vessels, being most abundant in (2), whereas none occurred in leaf sectors in open containers (with low humidity). The hexagonal crystals observed in *N. glutinosa* and its hybrid in tests were essentially similar to those found in systemic lesions in Turkish tobacco, except for a lack of stability in the cell involving rapid dissolution after five minutes in tap water at 25° to 28°.

The formation of the two types of structures under discussion appears to be associated with a diminution of the necrotic action of the virus on the cells under the influence of such factors as high humidity, increased carbon dioxide concentration, and darkness, which presumably operate similarly to sodium cyanide in the inhibition of virus multiplication [ibid., xix, p. 437].

Frampton (V. L.) & Takahashi (W. N.). **Electrophoretic studies with plant viruses. I. Tobacco mosaic virus.**—*Arch. Biochem., N.Y.*, iv, 2, pp. 249–253, 3 diags., 1944.

The Longsworth scanning patterns (*J. Amer. chem. Soc.*, lxi, p. 529, 1939) obtained with extracts from healthy tobacco leaves up to three months old at P_H 7·5 indicate the presence therein of three protein components, while similar extracts from mosaic-diseased plants contain an additional protein, the appearance of which coincides with the development of symptoms in the infected foliage. This substance is believed to be the virus itself. The normal proteins evidently undergo no change, either of nature or concentration, as a result of the disease.

Glasscock (H. H.) & Ware (W. M.). **Alternaria blight of Tomatoes.**—*J. Minist. Agric.*, li, 9, pp. 417–418, 1944.

On 22nd September, 1944, a plantation of $1\frac{1}{4}$ acres of outdoor tomatoes of the varieties Potentate, Ailsa Craig, and E.S.1 at Ramsgate, Kent, showed most of the leaves to be dead and shrivelled, while the stems were covered with dark brown patches and spots, and many of the fruits were falling and rotting. A few days later, specimens of foliage and fruit from a similarly affected nursery in West Sussex were received. The fungus associated with the condition in both localities was critically examined and found to agree in its characters, the symptoms produced on the host, and in the formation of a wine-red colour in the agar medium of cultures with *Alternaria solani*. W. Buddin subsequently reported that the

disease was present in the Isle of Wight. These appear to be the first outbreaks of the disease in Britain.

[A preliminary account of this work appeared in *Nature, Lond.*, cliv, 3916, p. 642, 1944.]

Hickman (C. J.). **The perithecial stage of Didymella lycopersici.**—*Nature, Lond.*, cliv, 3918, p. 708, 1944.

The perithecial stage of *Didymella lycopersici* was observed in October, 1943, on a single outdoor tomato plant at Long Ashton, mature perithecia also being found on three subsequent occasions. The evidence showed that perithecial development in *D. lycopersici* may occur at any time of the year. The constant presence of these organs near the soil suggests that moisture supply and, possibly, soil nutrients may be factors governing their formation. This appears to be the first record of the occurrence of perithecia of this fungus under natural conditions on the host. The observations were mainly confined to outdoor plants, but it is not unlikely that the perithecial stage also occurs on glasshouse tomatoes.

Berkeley (G. H.) & Richardson (J. K.). **Tomato diseases.**—*Fmrs' Bull. Canad. Dep. Agric.* 122, 18 pp., 4 pl., 1944.

Up-to-date information is presented on the fungal, bacterial, physiological, and virus diseases of tomatoes in Canada and their control.

Richardson (J. K.) & Berkeley (G. H.). **Basal rot of Tomato.**—*Phytopathology*, xxxiv, 7, pp. 615–621, 2 figs., 1944.

The fungi predominating in the 1,700 isolations on potato dextrose agar from tomato plants affected by a hitherto unreported basal rot in the London, Ontario, district of Canada in 1936–7 and 1942 were species of *Trichoderma*, *Fusarium*, *Cylindrocarpon*, *Pythium*, and an unidentified organism herein designated *TR*. The last-named developed more consistently, though not more frequently, than the other fungi from the various types of plated material, thus suggesting an etiological connexion with the disease, which may reduce the crop by up to 50 per cent. Soil inoculation experiments with *TR*, moreover, resulted in the appearance of the typical symptoms of the rot, including premature shedding of the leaves from the base upwards, dwarfing, a marked tendency to wilt during periods of excessive transpiration, necrotic lesions and 'cankers' on the stalk and roots, and a russeting of the epidermal root tissues.

TR grows slowly, requiring three to four weeks to cover the surface of a 10 cm. Petri dish. The aerial mycelium is compact-cottony, smooth, or slightly tufted, pale grey, at times faintly pink-tinged, the reverse of the colony being zonate, greyish-brown to greenish-black, with a narrow, light-coloured margin. At maturity the mycelium is 2 to 4 μ in diameter, closely septate, constricted at or rarely between the septa, and presenting the appearance of chains of irregular, thin-walled chlamydospores.

Effective control of the disease in the Grand Rapids variety was secured by soil treatment with steam, chloropicrin (applied by means of a Larvajector at dosages of 2½ c.c., 6 to 8 in. deep and 10 in. apart), or formalin (¾ gal. per sq. ft.). In 1941 the weight of the plants in the sterilized plots ranged from 9·9 to 10·6 lb. compared with 5·5 lb. in the untreated controls, the corresponding figures for the 1942 tests being 2·6 to 3·2 and 1·2 lb., respectively.

Peiris (J. W. L.). **A leaf curl disease of Tomato and its relation to some other plants.**—*Trop. Agriculturist*, c, 1, pp. 14–19, 2 pl., 1944.

Tomatoes growing in Ceylon are commonly affected by a condition causing general stunting, curling and bronzing of the leaves, and, sometimes, a fatal die-

back. Investigations [which are described] demonstrated that the malformation was due to injury by a species of mites, and that other hosts than tomato are also affected.

Tomato plant defoliation.—*Food Packer, N.Y.*, xxv, 10, p. 43, 1944.

It has been observed in home gardens, where tomato fruits are removed as soon as they ripen, that late-season defoliation [*R.A.M.*, xxii, p. 331] (a major problem in the eastern and mid-western tomato-producing areas of the United States) is less prevalent than in the field, where over-ripe fruits are allowed to accumulate. Tests were accordingly carried out at the Illinois, New York (Geneva), and Indiana Experiment Stations to determine the practicability or otherwise of this method of combating the trouble, but in no case did the effects of removing the over-mature fruit warrant the extra cost involved. At Geneva the application to the crop of 44 per cent. copper fungicide reduced the incidence of *Septoria* [*lycopersici*] from a maximum of 83·6 to one of 10·7 per cent. At Lafayette, Indiana, where the fungus was also prevalent and serious towards the close of the season, the amount of defoliation in the plots treated with a copper-lime dust after each rainy period ranged from 47·8 to 62·6 per cent., compared with 65·1 to 81·4 per cent. in the controls.

Rudolph (B. A.). **The unimportance of Tomato seed in the dissemination of Verticillium wilt in California.**—*Phytopathology*, xxxiv, 7, pp. 622–630, 1944.

It is inferred, from the largely negative results of experiments on the transmissibility of *Verticillium albo-atrum* by way of tomato seed, that this mode of perpetuation of the fungus is without importance, at any rate under Californian conditions.

Henry (B. W.). **Chalara quercina n.sp., the cause of Oak wilt.**—*Phytopathology*, xxxiv, 7, pp. 631–635, 1 fig., 1944.

Chalara quercina n.sp. is the name proposed for the agent of a destructive wilt affecting *Quercus alba*, *Q. borealis*, *Q. coccinea*, *Q. macrocarpa*, and *Q. velutina* [see next abstract] in Illinois, Iowa, Minnesota, and Wisconsin. On 2 per cent. malt agar the fungus produces a fluffy mycelial mat, 1 to 3 mm. in height, grey to olive-green with occasional tan patches; septate, branched, subhyaline to brown sterile hyphae, 2·5 to 6 μ in diameter, from which the conidiophores are poorly differentiated; tan to black, irregular, loosely knit sclerotia, up to 2·5 cm. in diameter (not consistently present); subhyaline to brown spore-bearing cells, terminating branches of variable length, 20 to 40 by 2·5 to 4·5 μ; and endogenous, hyaline, cylindrical, continuous, catenulate conidia, truncate at both ends, 4 to 22 by 2 to 4·5 (mean 6·5 by 3) μ. The differences between the new species and the four other members of the genus (all saprophytes) on oak, viz., *C. affinis*, *C. fusidioides*, *C. heterospora*, and *C. setosa*, are briefly indicated. The minimum, optimum, and maximum germination temperatures for *C. quercina* are 8°, 24° to 28°, and 32° C., respectively.

Henry (B. W.), Moses (C. S.), Richards (C. Audrey), & Riker (A. J.). **Oak wilt: its significance, symptoms, and cause.**—*Phytopathology*, xxxiv, 7, pp. 636–647, 2 figs., 1944.

The presence of oak wilt (*Chalara quercina*) [see preceding abstract] has been confirmed, by positive cultural studies, in 23 counties of Wisconsin, five of Minnesota, two of Iowa, and one of Illinois, the red (*Quercus borealis*) and black (*Q. velutina*) species being the most susceptible and sustaining irretrievable damage. No correlation was observed between the occurrence of the pathogen and such factors as soil type, reaction, or nutritional content.

The preliminary crinkling and pallor of the foliage was often followed by a progressive bronzing or browning of the leaf blade from the margins and apex towards the midrib and base, accompanied in the case of young leaves by pronounced drooping. Defoliation of varying extent took place at any stage of infection of mature leaves. The symptoms usually involved the entire tree within a few weeks. The secondary foliage put forth by the trunk and larger branches successively wilted and died. A brown to black discoloration of the twig sapwood was commonly present, but did not constitute a reliable diagnostic character.

C. quercina was isolated from 116 out of 122 wilted trees and inoculated with positive results into 74 out of 90 woodland oaks.

CLAPPER (R. B.). **Improved cork-borer method for inoculating trees.**—*Phytopathology*, xxxiv, 8, pp. 761–762, 1 fig., 1944.

Details are given of an improved device facilitating the application of the cork-borer method (*Phytopathology*, xxiii, pp. 487–488, 1933) to the large-scale inoculation of trees. In the summer of 1943, for instance, about 3,300 inoculations were performed on 1,800 chestnut hybrids, and in operations of this order the elimination of even one movement effects a considerable saving of time. The use of the ordinary cork-borer necessitates picking up the accessory wire or rod-plunger to punch out the cork plug, whereas with the improved instrument the thumb of the hand holding the borer presses against the copper, aluminium, or plastic plunger, which is introduced into the tube through the upper end and fitted with a spring in such a way as to form an integral part of the appliance.

LARGE (J. R.). **Web blight of seedling Tung trees tentatively identified as the Rhizoctonia stage of Corticium microsclerotia.**—*Phytopathology*, xxxiv, 7, pp. 648–649, 1 fig., 1944.

A fungus isolated on water and Lima bean agars from the pale tan lesions, 0·2 to 2 cm. in diameter, covered in rainy weather with a fine hyphal web bearing tufts of light brown sclerotia, on the basal leaves of tung [*Aleurites fordii*] seedlings in Louisiana in 1942 and 1943 produced sclerotia measuring 80 to 300 by 80 to 200 (average 200 by 150) μ, on the basis of which it is tentatively identified as the *Rhizoctonia* stage of *Corticium microsclerotia*. Inoculation experiments on beans with these organs resulted in the development of the typical web blight symptoms described by Weber as due to *C. microsclerotia* [*R.A.M.*, xix, p. 3], among the 24 hosts of which, however, *A. fordii* was not included.

MCLEAN (D. M.). **Histo-pathologic changes in the phloem of American Elm affected with the virus causing phloem necrosis.**—*Phytopathology*, xxxiv, 9, pp. 818–826, 3 figs., 1944.

Following the inoculation of healthy two-year-old American elms in 'complete' aqueous culture solutions with the phloem-necrosis virus [*R.A.M.*, xxii, p. 45] by means of patch-grafting diseased bark tissue on the stem bases, the fibrous roots first undergo necrosis, which then progresses into the larger roots and may finally involve the inner phloem of the lower portion of the stem. Microscopic pathological alterations in the primary phloem tissue of the root include hypertrophied cells and nuclei in proximity to the mature sieve-tubes, succeeded by hyperplasia and eventual crushing of the sieve-tube and companion cells in the older tissues. In the phloem of the older roots and stem the most conspicuous microscopic changes appear in the hyperplasia and hypertrophy of the parenchyma.

A yellow to brown discoloration of the phloem tissue develops in the necrotic roots and usually proceeds into the stem and lower branches before the death of the tree. A faint odour of wintergreen emanates from the freshly cut diseased tissues, but not from comparable healthy material.